THE IRON AGE

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A Late Mechanical Engineering Laboratory

Arrangement and Equipment at Ohio State University for Testing Materials and Hydraulic, Ventilating and Steam and Gas Power Plant Apparatus

BY ELLSWORTH TONKIN

The mechanical and electrical engineering laboratory building of Ohio State University, Columbus Ohio, is of modern factory construction with walls of dark red corduroy faced brick and that portion of the roof visible from the front of red tile. The remainder of the roof is of sawtooth construction with northern skylights running nearly the whole width of the building. The main floor consists of eight bays, seven of which are 30 x 112 ft, and the eighth 48 x 144 ft. All are of the same hight, 22 ft. The inside is of steel construction with balconies along the columns for light experimental work and drawing space, as illustrated in Fig. 1. The offices and recitation rooms on the first and second floors, as well as the drawing room on the balconies, are only temporary. There is to be another building for these and the present building used only for laboratory work.

With Fig. 2, which is a plan of the laboratory, the reader can locate the different apparatus described. Starting at the south end of the building the first bay is used for the testing of materials, for fan experiments and that class of apparatus requiring the use of a transmission dynamometer. The testing machines are as follows: A Riehle 42,000-lb. old style hydraulic tension and compression machine; a Riehle 10,000-lb. transverse testing machine; a new Riehle 50,000-lb. tension and compression machine; an Olsen 20,000-lb. motor driven wire tester, an Olsen torsion and an Olsen 100,000-lb automatic and autographic tension and compression machine. The testing machines requiring power are belted to a line shaft, which is driven by a motor.

Next are the fans, the first of which is a 60-in. Sturtevant ventilating fan driven from a Flather dynamometer, which in turn is driven by a Reeves speed changing device of 25 hp. capacity, belted to the main line shaft overhead. This arrangement makes it possible to drive the fan or any other piece of similar apparatus under a variety of conditions. From the Robinson dynamometer, which is belted to the main line shaft, can be driven either the 48-in. disk fan or a 50-in. ventilating fan built especially for this laboratory based on the principles of large size mine fans.

The 8 x 8 x 5 x 10-in. Norwalk two-stage air compressor in this bay has a reservoir located in the balcony where the quantity compressed is measured by means of an orifice or Pitot tube. The compressor is also connected to a Wheeler condenser for the purpose of determining its

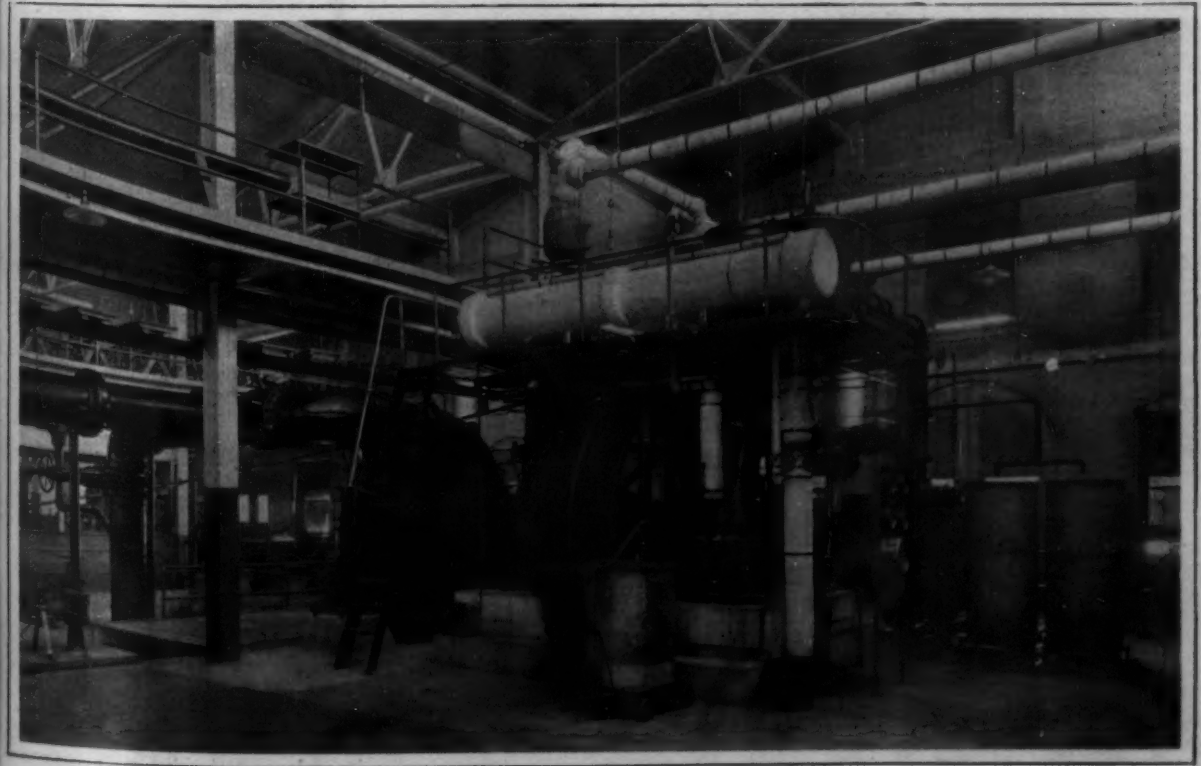


Fig. 1—View in the Steam Engine Testing Department of the Laboratory

water rate. The main line shaft over head mentioned can be driven by a motor, by the straight line engine or by the Buffalo or Sturtevant engines belted to a counter shaft overhead which in turn drives the main line shaft through rope and sheaves. In this section there is also the tool room and shop for the department mechanician.

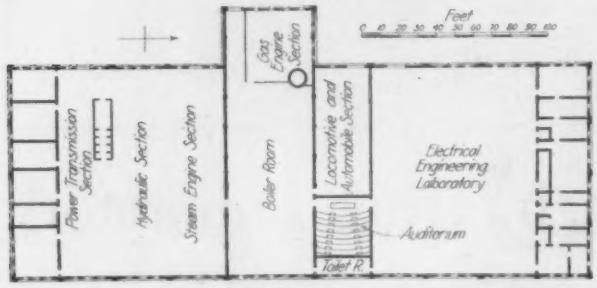


Fig. 2—General Plan of the Mechanical Engineering Laboratory

The hydraulic section in the second bay has twelve cisterns, varying in size from 4 x 15 x 10 ft. for the smaller to 15 x 24 x 12 ft. for the larger. The dividing walls of the cistern are provided with weir frames and plates; some also have submerged orifices up to 24 in. diameter. The central cistern is fitted up as an observation well, in which there are glass gages connected to each cistern, also large glass cylinders containing the hook gages belonging to the several weirs. This arrangement reduces to a minimum the trouble of determining the water levels or head over the weirs. In one of the cisterns is indicated a 5-ft. diameter well, which is 20 ft. deep. This, plus the 10 ft. for the depth of the cistern, makes a possible head of 30 ft. for testing pumps on actual lifts. Some of the cisterns, especially the central ones, are covered with reinforced concrete slabs of strength enough to stand heavy machinery and also of such size as to be conveniently removed if necessary.

There are also the following pumps: A Worthington centrifugal pump of 12,000 gal. capacity direct connected to a 250-hp. Buckeye engine illustrated in Fig. 1 and described in *The Iron Age* of January 18; a Dean 5 x 6-in. single-acting triplex power pump driven from the center shaft overhead; a 7½ and 12 x 5¼ x 8-in. Blake cross-compound pump; a 5-in. centrifugal pump direct connected to a 70-hp. Kerr steam turbine; a 10 x 16 x 12 x 10-in. Worthington tandem-compound duplex plunger pump, and a 12 x 7 x 12-in. Knowles outside packed plunger pump. The last four mentioned pumps are connected to a 12-in. main suction line which in turn connects to the several cisterns and delivers it through a 6-in. main overhead to wherever desired. They are also connected to a Wheeler condenser shown near the pumps. Besides the pumps mentioned there is a 4-in. centrifugal pump driven from the main shaft and a 3-in. centrifugal pump driven through the Reeves speed-changing device and Flather dynamometer, which pump supplies water to a pipe line on the balcony running the full width of the building and return, with a Venturi meter on the end. The velocity of the water may be made to vary, affording excellent opportunity for studying the loss of head due to friction. There is a 38-in. Leffel Cascade and small impulse wheels of the Pelton and American type supplied from the 6-in. delivery pipe overhead; a 10-in. Leffel turbine connected to a 24-in. closed top standpipe; a 24-in. standpipe, 24 ft. high, with closed top and vent pipe

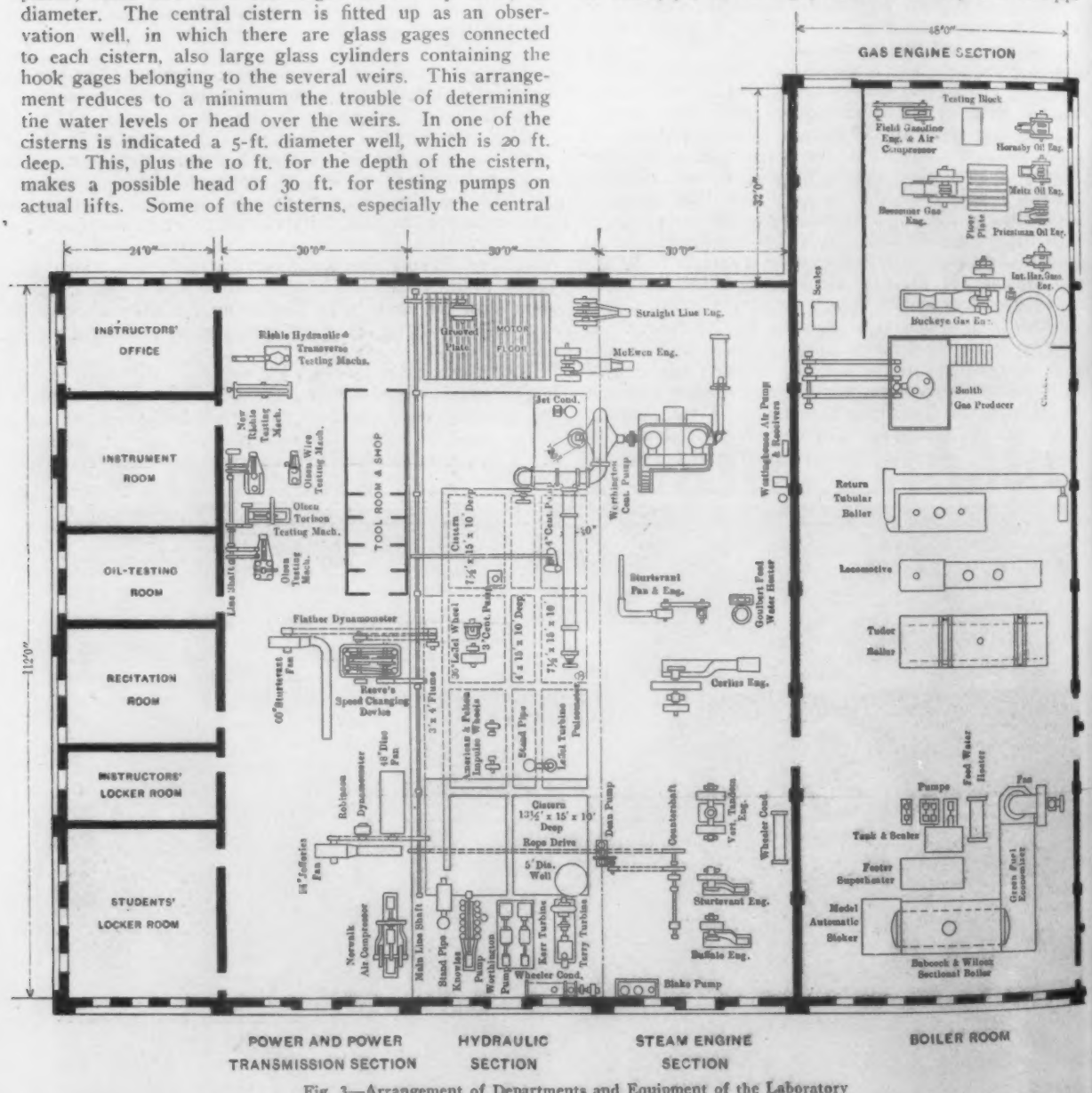


Fig. 3—Arrangement of Departments and Equipment of the Laboratory

so that pressures up to 100 lb. may be carried and the water measured at the bottom as it passes out through a 24 x 48-in. drum and nozzle; a hydraulic ram; a pulsometer and grooved floor plate in front of the McEwen and Straight-Line engines for testing outside apparatus.

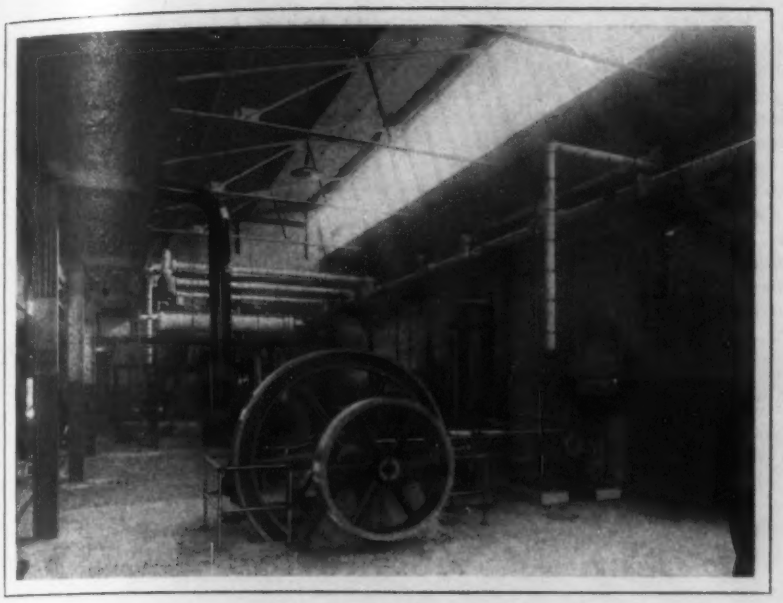


Fig. 4—View in the Steam Engine Testing Department

arrangement enables the steam consumption of the Corliss engine to be determined at the boiler and at the condenser. This engine is illustrated in the foreground of Fig. 4. There are also a 4½ and 10 x 6-in. vertical tandem compound engine designed solely for instruction purposes so made that it can be run with high pressure on either or both cylinders, and with or without the Stevenson link motion; an 2 x 12-in. Sturtevant engine and a 12 x 12-in. Buffalo throttling governor engine, which may be connected to the Wheeler surface condenser. The last two engines may also be belted to the countershaft overhead. The engines in this section can be tested with the prony brake besides driving apparatus mentioned in connection with them. There is in addition to the engines an 18-in. Kerr multistage turbine, direct connected to a 5-in. centrifugal pump; also a small Terry turbine with a vortex air pump on the Wheeler surface condenser in the hydraulic section.

The fourth bay is subdivided into the gas engine section and the boiler room or fuel testing section. Fig. 5 illustrates the boiler section which contains the following units: A Smith 80-hp. gas producer in the foreground; a 100-hp. boiler of the firebox return tubular type; a Pennsylvania Railroad locomotive boiler, a 90-hp. Tudor flue boiler; then the principal experimental boiler which is a 107-hp. Babcock & Wilcox sectional boiler, illustrated in Fig. 6 with the following accessories: a Model automatic stoker on the front; a dutch oven furnace under the rear in order to make comparison between hand firing and stroking on the same boiler; a Greene fuel economizer on the right of the rear with a forced induced draft fan so arranged that it may or may not be used in connection with the boiler; a feed water heater and pumps, tank and scales on the platform above and a Foster superheater under the platform. The connections to the chimney for these boilers are made underneath the floor in the rear of them. Fig. 5 illustrates the piping

The capacity of the pumps is measured by the water as it flows from one cistern to another over the weirs. In the case of the impulse wheels their horse power is determined by prony brakes.

The engines in the third bay, or steam engine section, are as follows: A 9 x 12-in. Straight-Line automatic cut-off; an 8 and 13 x 12-in. McEwen tandem compound, and a 13 x 25 x 16-in. Buckeye vertical cross-compound engine, which is direct connected to the Worthington pump illustrated in Figure 1. All are so arranged that they may be connected to the Wheeler surface condenser. The Straight-Line and McEwen engines may also be connected to the jet condenser over the cistern. Next is a small Sturtevant vertical engine belted to a fan piped to carry experiments on the balcony above; and a 10 x 30-in. Corliss engine, which has an independent steam connection to one of the boilers and also can be made to exhaust into a Goubert closed feed-water heater which may be used as a condenser. Therefore this

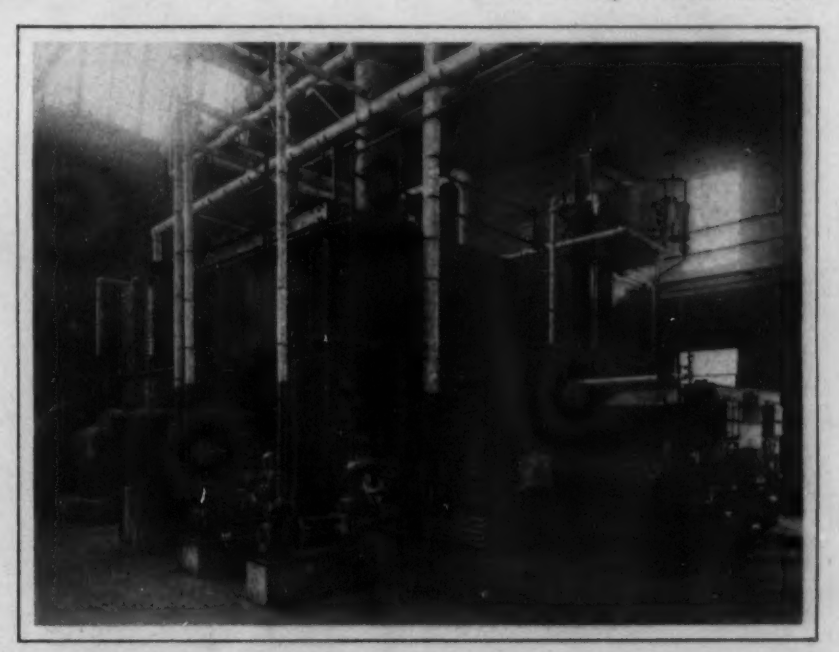


Fig. 6—Steam Boiler Equipment with Hand and Mechanical Firing, Mechanical Draft, Fuel Economizer, Superheater, Etc.

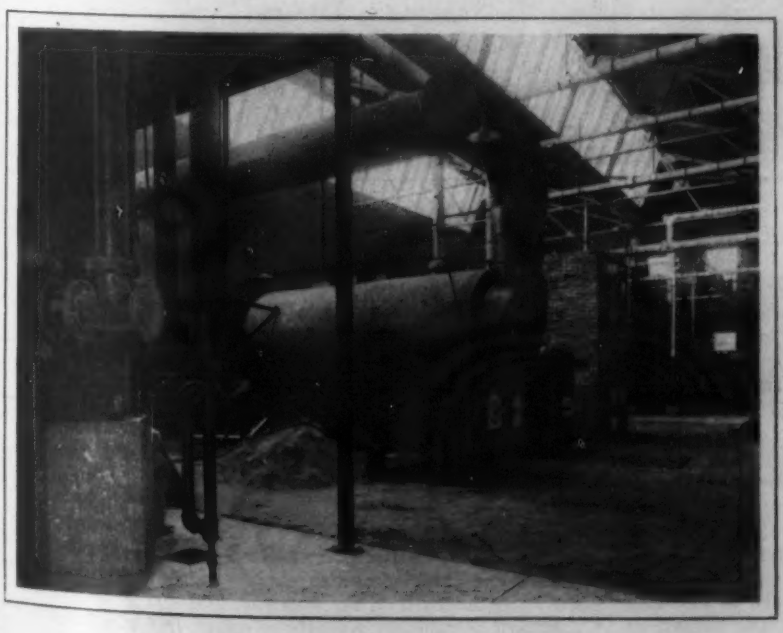


Fig. 5—View in the Boiler and Fuel Testing Department

from the boilers which go through the wall to the main header shown in Fig. 4. This main line also has a connection to the University power plant so that it is not necessary to operate the boilers when steam is wanted for other purposes. The illustrations also show how well the boilers and pipes are covered to prevent radiation of heat and condensation of the steam, which is a big factor in testing boilers.

In the gas engine section which is nearly all illustrated in Fig. 7, there are the following engines: A 25-hp. Bessemer gas engine in the foreground and a two-cylinder Buckeye engine of 80 hp. on producer gas or 100 hp. on natural gas, the producer gas being finished by the Smith gas producer in the boiler section. Starting at the chimney in the illustration, there is a 6-hp. International Harvester gasoline, an 8-hp. Priestman safety oil, a 6-hp. Mietz & Weiss oil and a 10-hp. Hornsby-Akroyd oil engine and a 6-hp. Field-Brundage gasoline engine. The last two are not shown in the illustration. The Field-Brundage engine is belted to an air compressor used in starting the Bessemer and Buckeye engines. In front of the Bessemer engine, there is a floor plate on which is being tested at the present time a 4-cylinder 60-hp. Seagroves gasoline motor.

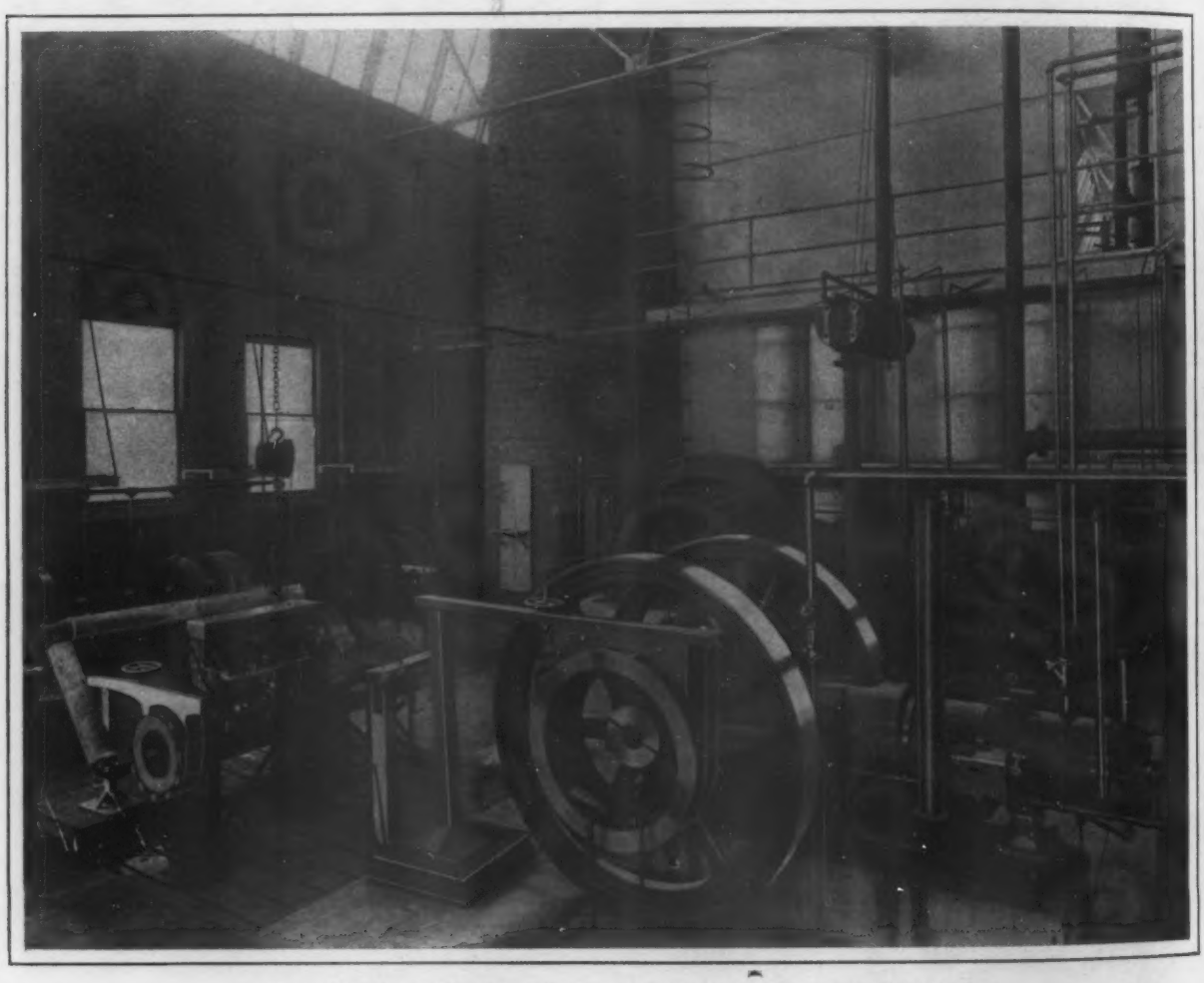


Fig. 7—View in the Gas Engine Section of the Mechanical Engineering Laboratory

The engines in this department are also tested with the prony brakes, as seen in the illustration on the Bessemer engine.

The fifth bay contains the auditorium and what was planned for a locomotive testing laboratory. This room, however, will be eventually used for refrigerating work and automobile testing only, as it is proposed to have the locomotive laboratory entirely independent of the present building. The remaining three bays are used by the electrical engineering department for its laboratory. There is a very well equipped instrument room and also a special room for oil testing.

The building is heated by the hot blast system, a 130-in. fan being used for this purpose. This equipment is so located and connected up that it may be used at any time for experimental work in connection with the subject of heating and ventilating. Besides the work done in the laboratory members of the senior class every year conduct tests on locomotives in actual service on the Hocking Valley Railroad.

In conclusion the author desires to emphasize that visitors will be welcomed and be gladly shown what is being done at the Ohio State University.

The National Metal Trades Association

Annual Meeting April 11, in New York

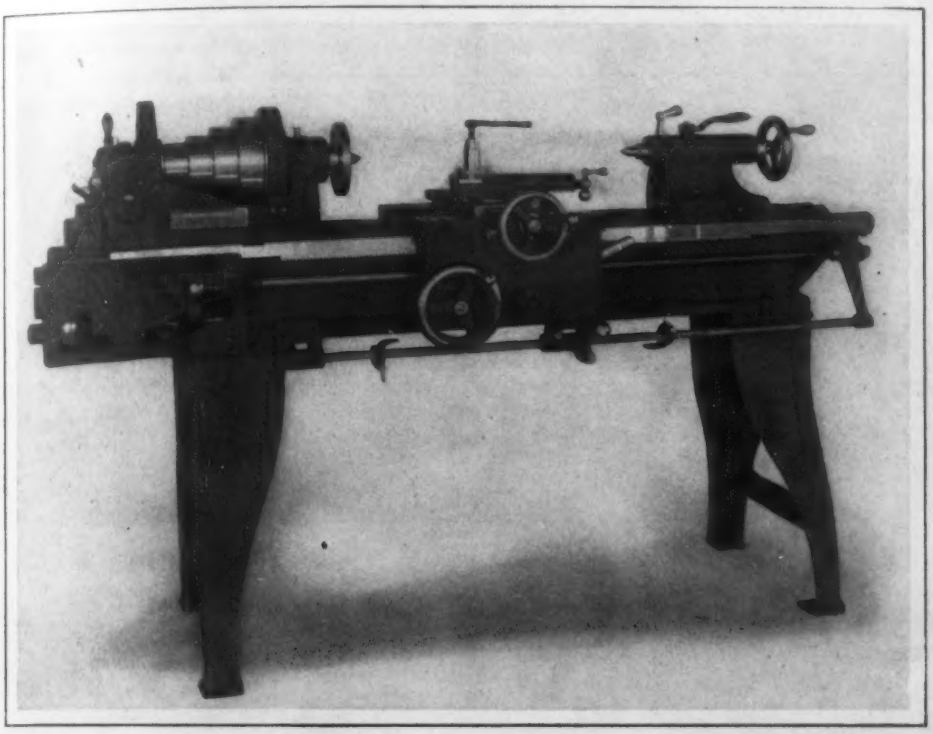
Commissioner Robert Wuest announces that the next meeting of the Administrative Council of the National Metal Trades Association will be held at the Hotel Astor, New York City, Wednesday, April 10. After a morning session it will adjourn from 12 to 2 for the purpose of discussing labor bureaus at luncheon with the presidents and secretaries of the local branches. On the evening of the same date the alumni members will hold their regular annual dinner.

On Thursday, April 11, at 9 o'clock sharp the fourteenth annual convention of the association will be opened, and it is expected that one of the most interesting meetings will be held. On the evening of the same day the convention banquet will take place and three of the best informed men on up-to-the-minute subjects will speak. All of the sessions, the banquet and the luncheon will be held at the Hotel Astor.

The Norwalk Foundry Company, Norwalk, Ohio, will take up the manufacture of a line of warm air furnaces. The company has recently purchased the ground and building adjoining its present plant formerly occupied by the Standard Machine Company. H. A. Rasor, who was formerly engaged in the furnace business in Barberton, Ohio, has become associated with the company. This company is a reorganization of the Norwalk Iron & Brass Foundry Company, which was recently effected with an increase of capital from $10,000 to $25,000.

The Seneca Falls 12-In. Lathe

In addition to the 14 and 16-in. quick-change lathes, the former of which was illustrated in *The Iron Age* November 24, 1910, the Seneca Falls Mfg. Company, 255 Water street, Seneca Falls, N. Y., has just placed on the market a 12-in. quick-change lathe of the same design. Although the general construction is the same as the two earlier sizes, this more recent tool contains several new features which facilitate convenient operation.



The New 12-In. Quick Change Lathe With 6-Ft. Bed Built by the Seneca Falls Mfg. Company, Seneca Falls, N. Y.

The quick-change feed mechanism consists of a cone of eight steel gears located on the lead screw in the right side of the feed cage. A tumbler yoke and gears enable connection to be made with any one of these gears from the lower shaft, which has three changes of speed, through another tumbler and set of gears in the left end of the cage. The lever on the head stock imparts two different speeds to the set of gears in the left end of the cage and in this way the lead screw, which is also employed as a feed rod, has 48 changes ranging from 0.0023 to 0.142 in. per revolution of the head stock spindle. In addition to this wide range of feeds all standard threads from 1½ to 92 per inch can be cut and the way in which any desired thread or feed can be easily obtained is clearly shown on an index plate.

The stop for the cross slide is what is known as a micrometer stop and receives its name from the micrometer feature by which minute adjustments are easily made. The relative positions of the stops are changed through a worm gear operated by a screw with knurled knob and permits the tool to advance as indicated by the graduations on the micrometer barrel, which are about ¼ in. apart and are each equal to 0.025 in. The knob inside of the hand wheel is pushed in and out to throw the stop mechanism in and out of engagement. This stop acts directly on the cross-feed screw, an arrangement which is said to be more effective than a stop which acts on the cross slide. If desired the tool can be fed away from the work for a considerable distance and when returned it will stop as indicated by the graduations. In this way since the stop is positive in its action it is possible to cut accurately to a given depth on either inside or outside work without taking several trial cuts to obtain a desired measurement or stopping the lathe to caliper the work. It is pointed out that the use of this stop insures uniformity in making duplicate parts since the depth of the cut cannot be varied by crowding the tool. This stop can also be used with the taper attachment if it is so desired.

The reversing mechanism for both the cross and the longitudinal feeds and the lead screw consists of a set of spur gears and a clutch in the head stock operated through levers connected by the reversing rod to the hand lever on the apron. In this way the operator is given more control of the tool from the apron with the result that the turning out of large quantities of work is facilitated. This arrangement does away with the necessity for using a crossed belt on the countershaft and gives 16 forward speeds to the head stock spindle. For use when cutting threads an automatic stock device for the carriage which operates in either direction by adjustable stops on the reverse rod is provided.

The head stock is of the builder's deep web pattern and has a forged crucible steel spindle, revolving in large bearings provided with ring oilers. The cone pulley steps are of large diameter and are wide enough for a 2-in. belt. If desired a draw-in chuck with collets up to ¾ in. in diameter can be supplied. The carriage is wide with full-length solid bearings on V-ways. The plain and the compound rests are secured to the cross slide by a new binding device which facilitates the making of adjustments, and as the ordinary slots for binder bolts are omitted, it is pointed out that this part is not weakened.

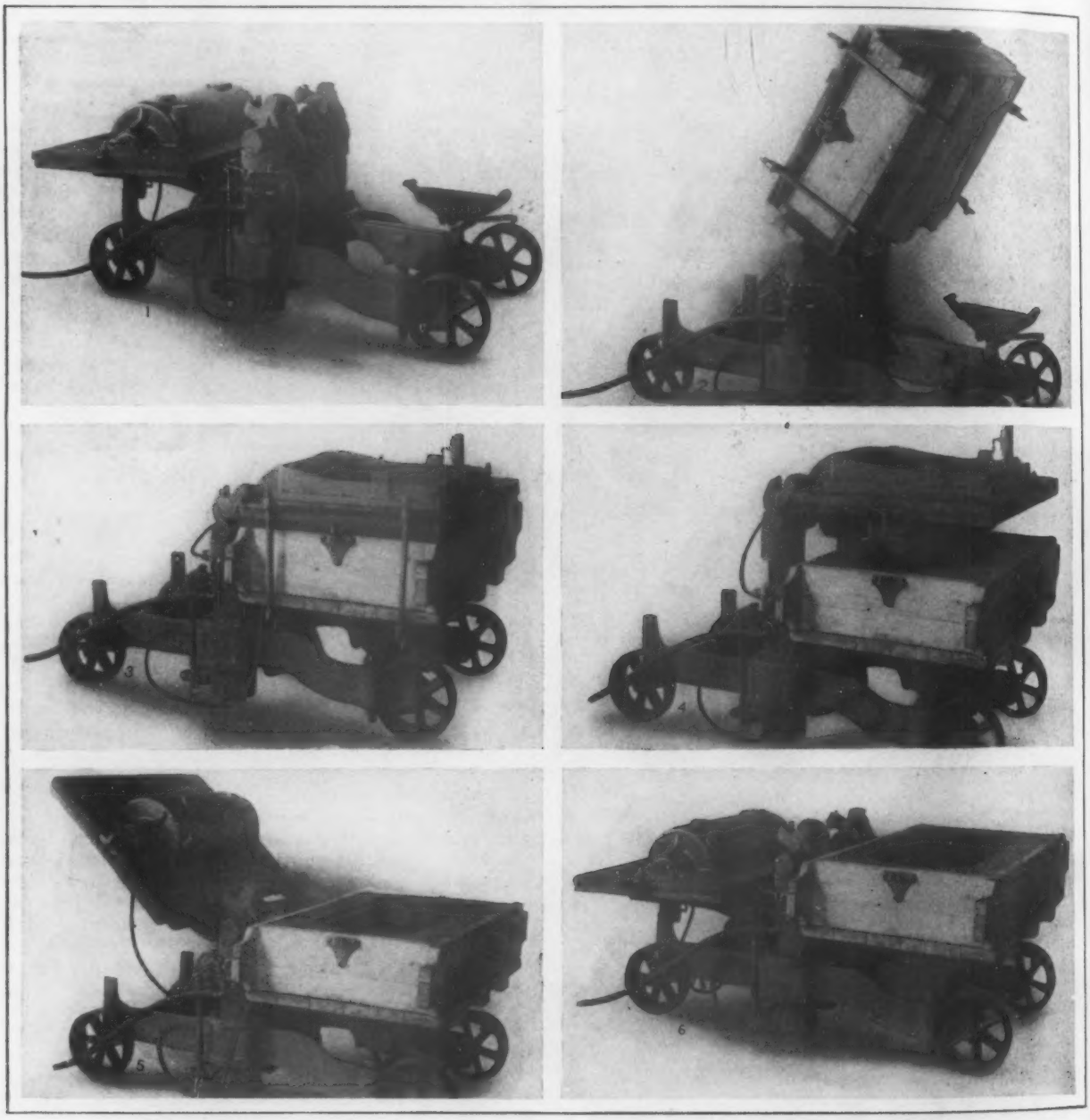
The carriage is arranged for a taper attachment, which can be affixed at any time. The cross-feed screw has a large collar graduated to read in thousandths of an inch, the graduations being about 1/16 in. apart and thus easily read. The apron is well reinforced by ribbing and the gears in it have wide faces and are of coarse pitch. All possibility of engaging opposing feeds is said to have been eliminated by the use of an automatic safety device, one feed being automatically disengaged when the other is thrown in. When threads are being cut the feed gearing is disengaged and the longitudinal hand wheel does not revolve. The countershaft has friction pulleys with a large friction surface on the rim and the wear on these parts has been eliminated when the pulley is running idle. To give ample bearing surface on the shaft the hubs of the pulleys are made larger than usual. The pulleys can be oiled without throwing off the belt, and felt wipers clean the carriage ways of dirt and spread the oil over them.

The Lea Equipment Company, manufacturer of high duty centrifugal pumping equipment and the Lea-Simplex cold saws, which has heretofore had its general offices at 90 West street, New York, has found it necessary to enlarge its facilities to accommodate its growing trade, and has moved these offices to the works, at the corner of Stenton and Wyoming avenues, Philadelphia, Pa. It will, however, retain quarters in the West street building, from which point the export and Eastern trade will be served by the president, Albert G. Lea. The export department of the company has grown to such dimensions that it demands a separate selling department to properly conduct its extensive ramifications. The general sales offices, located at the works, will be under the supervision of H. R. Williams, general sales manager, who has been identified with a number of concerns in the same line of work.

New Style Molding Machine

A Recent Development of the Power Turn-Over Power Draft Pattern by the International Molding Machine Company

A turn-over draw design of molding machine, which differs from other power machines now on the market in that separate cylinders are used for turning the mold over and for drawing the pattern, has been developed by the International Molding Machine Company, Chicago, Ill.



Successive Stages in the Operation of a Recently Developed Power Turn-Over Power Draft Machine, Built by the International Molding Machine Company, Chicago, Ill.

One of the advantages claimed for its construction is that there is minimum consumption of air and at no time during the operation of the machine are the drawing cylinders and the turn-over cylinder being used simultaneously. Thus less pressure is required to draw the pattern than to turn the mold over. Two small cylinders are employed for performing the former operation and a large one for turning over and this arrangement, it is pointed out, also avoids an excessive air consumption and at the same time the placing of the drawing cylinders one on each side of the machine also tends to keep the pattern from swaying or sagging while it is being drawn.

The machine is illustrated in Fig. 1 with an automobile oil pan pattern mounted and ready to receive the flask. After this has been done and the mold rammed up and clamped with the bottom board to the pattern frame, the valve for operating the turn-over cylinder is opened, the full movement of the lever turning the mold over to the position shown in Fig. 2, or just past the center. When the mold reaches this position the air is exhausted and the mold is lowered upon the receiving bed as illustrated in Fig. 3. Air is then admitted to the drawing cylinder and the pattern is lifted away from the mold as is clearly brought out in Fig. 4. When the limit of the draw which is controlled by the length of the turn-over cylinder piston shaft has been reached the frame automatically commences to return to its original position and as it passes the center the air is exhausted and the pattern frame is lowered upon the stops of the ramming bed as shown in Fig. 5. By this time the mold is then ready to be lifted to the floor as illustrated in Fig. 6.

In designing this machine the builder has endeavored to provide for the convenience of the molder in every possible way, for the acceleration of the speed with which it can be operated, for the varying conditions under which it will be used and for the variety of patterns it may be required to mold. There are separate levers for operating the turn-over and the pattern-drawing cylinders and there are no parts that stand out awkwardly and thus impede the operator's movements. The valves have been so designed that it is not necessary to use either oil or water pressure to make the machine operate smoothly. All the parts subjected to strain are made of steel and those parts requiring lubrication have been made readily accessible.

It will be seen from an examination of the accompanying engraving that the machine consists of a heavy cast-

iron stand composed of two side rails connected at both ends by cross rails. These together with their adjacent parts form the ramming bed at one end and the receiving table at the other. Large round sockets which receive the two side cylinders are cast in the center of the side rails. The sockets are accurately machined on their upper surface and there is an annular flange on the cylinder which is also machined on its lower surface so that when the cylinders are put in position they are absolutely perpendicular. The turn-over pattern frame revolves on a heavy steel shaft which is forced into the cast-iron hubs that form the top of the piston of the drawing cylinder. Two sets of heavy bearings or stops are cast integral with these hubs and are so arranged as to engage corresponding bearings or stops on the turn-over frame. One set of these stops is adjustable and is used to locate the plane of the pattern at the proper angle with relation to the drawing cylinders and insure a perfect draw. The function of the other set of bearings is to limit the action of the turn-over frame when it is swung back upon the ramming bed.

The turn-over cylinder is held in position by the trunnions on each side which are journaled into sockets cast in the side of the two drawing cylinders. The receiving table of the machine consists of two flask receiving devices which can be adjusted for hight according to the depth of the flask used. The four points of contact act independently of each other and thus compensate for the warping of the various kinds of bottom boards employed. The locking lever is located where the operator can reach it at the right time without having to change his position, and the design of the locking mechanism is such that it is impossible for the surfaces on which the mold rests to spring until different equalization is required.

The machines are built in six sizes with turn-over pattern frames varying in width from 26 to 36 in. and with draws ranging from 8 to 14 in. Machines of the same size are interchangeable both as regards the different parts employed in their construction and the fitting of the patterns. The machine illustrated has a frame 30 in. wide and a pattern draw of 8 in. The weight of the mold is 1000 lb.

The J. G. Brill Company's Report

The annual report of the J. G. Brill Company, Philadelphia, Pa., presents the following income account for the year ended December 31, 1911:

Total sales and other income	$5,870,907.47
Less operating, general and administration expenses	5,181,497.90
Profit for the year	$689,409.57
Less amount set aside and added to reserve for depreciation	134,429.54
Net profit	$554,980.03

The combined balance sheet, including subsidiary companies, as of December 31, 1911, is as follows:

Assets.

Value of properties	$7,950,026.52
Materials, raw and in process	1,342,499.84
Bills and accounts receivable	1,489,697.90
Investments	283,221.99
Cash	349,442.25
Total	$11,414,888.50

Liabilities.

Preferred stock	$4,580,000.00
Common stock	5,000,600.00
Bonds (John Stephenson Company)	400,000.00
Bills and accounts payable	690,367.46
Surplus	744,521.04
Total	$11,414,888.50

From the accompanying remarks of President James Rawle the following extracts are taken:

While, during the year 1911, the conditions which governed the obtaining of orders and their execution were by no means normal, yet they were much improved in comparison with any year since 1907. This resulted in earnings from the year's business sufficient, after the deduction of all the liberal allowances for repairs, maintenance and depreciation, not only to meet the full dividends on the preferred stock declared during the year, but also to add to the combined surplus the sum of $234,380.03.

On February 10, 1912, the combined companies had orders in process of completion amounting to $3,152,156, with a good outlook for profitable work for the coming year.

Emery Wheel Protector and Dust Guard

With a view to protecting the workman and also ameliorating the conditions under which he labors, the Challenge Machine Company, Inc., Philadelphia, Pa., has developed two devices for use in connection with its grinding and polishing machines. The special advantages claimed for the devices are the protection of the workmen from injury following the breakage of a wheel, from inhaling grit and dust and from injury to the eyes due to the flying of heated particles of the abrasive. Grit and dust are also said to be scattered less freely among the other tools and entirely prevented when the chute is added. Fig. 1 is a view of the protector applied to one of the company's standard grinding machines, which was illustrated in *The Iron Age*, July 27, 1911, while the application of both devices is illustrated in Fig. 2.

The protector illustrated in Fig. 1 consists of a heavy arm bolted securely to the machine and four heavy steel bands, two at the top and two at the bottom, with the ends secured to heavy steel blocks, which in turn are bolted to the arm. This type of construction is said to produce strength without rigidity, and it is emphasized that a device of this character could not withstand the shock if perfectly rigid. It is also pointed out that a device of this nature should spring and not fly in pieces.

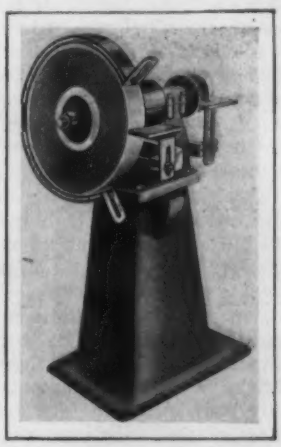


Fig. 1—The Emery Wheel Protector

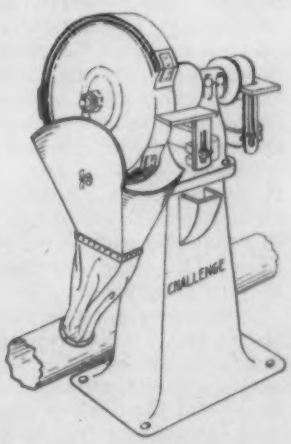


Fig. 2—The Protector and the Chute

Two New Devices for Use in Connection with an Emery Grinding Wheel Developed by the Challenge Machine Company, Inc., Philadelphia, Pa.

At the ends in front of the wheel are angle plates which hold in position shields arranged to follow the wheel as its diameter decreases by reason of wear. The function of the lower shield is to deflect the grindings from the wheels, while the upper one protects the eyes of the workman. This device is made in four sizes for wheels ranging from 12 to 18 in. in diameter, and can be easily put on and removed either entirely or in part.

In Fig. 2 the machine is shown equipped with the protector and also with a chute. The upper part of the chute is made of sheet metal, while the lower part is of canvas. The thumb screw shown in the middle of the upper portion regulates the rotation of the chute, its shank passing between the two lower steel bands of the protector. In this way the chute can be freely adjusted or moved if desired, and in addition close measurements and the labor of installing one or more machines is greatly simplified. Like the protector this device is made in four sizes.

Vice-President Arthur S. Huey, of H. M. Byllesby & Co., Chicago, has ordered ten Pulmotors for installation at 10 of the important Byllesby properties, delivery to be made as soon as possible. The Pulmotor is a machine manufactured by the Draeger Oxygen Apparatus Company, Pittsburgh, Pa., to aid in the resuscitation of persons overcome by asphyxiation, electric shock or poisoning—in all casese where respiration has been suspended or restricted. The properties selected for the initial installation are those at Pueblo, Colo., St. Paul, Minn., Fort Smith, Ark., Mobile, Ala., Muskogee, Okla., Oklahoma City, Okla., Eugene, Ore., San Diego, Cal., Stockton, Cal., and Tacoma, Wash. If the experience with these machines is satisfactory, Pulmotors will be installed at every Byllesby property in a short time.

The Blast Furnace Regenerative Stove

How Its Economy May Be Increased—Clean or Dirty Gas Supply—Gas Consumption, Heating Surface, Temperature, Types of Stove and Stacks

Regenerative stoves and their relation to blast furnace practice came in for special attention at a recent meeting in Pittsburgh of the Engineers' Society of Western Pennsylvania. The meeting was especially noteworthy for the large attendance and generous contributions of experts on blast furnace performance and centered about a paper presented by A. N. Diehl, superintendent of blast furnaces, Duquesne Works, Carnegie Steel Company, Duquesne, Pa. The paper in full, together with the discussion, has been printed in the Proceedings of the Society and from that source has been taken the following, beginning with an abstract of Mr. Diehl's paper and ending with extracts from the discussion:

At the Duquesne blast furnace of the Carnegie Steel Company, we have at present, three different types of stoves: The center combustion, two-pass; side combustion, two-pass, and three-pass stoves. The construction of the two-pass side combustion, is possibly the simplest—a strong point in its favor. A number of these stoves have been in use for many years and have given good satisfaction. One of the earlier objections was the proper construction of the combustion chamber, considerable trouble being experienced by the giving way of the walls, due to unequal expansion. Most of these difficulties have been over-come in the present construction. This stove is built up of standard size brick, so laid as to break all possible joints. We have also endeavored to cut out shapes wherever possible. The stove operates on dirty gas and has given us very good results.

Our two-pass, center combustion stoves are of the Kennedy type. The original stoves were constructed of concentric key boxes. We have since rebuilt some of these stoves with the standard size brick. They have individual stacks and the draft is unequally distributed; the checker work nearest the stack does most of the work until that portion becomes clogged with the dirt. This lowers the efficiency of the stove to a considerable extent. The three-pass stoves are capable of giving the highest temperature, but are of a more complicated construction. A dome separates the second and third passes on top of the stove, and must be constructed to allow for expansion and contraction, which very often lead to cracks requiring attention. The blast is admitted at the top of the stoves through a mushroom valve, brought down over the dome through the third pass and through the second pass up under the dome again, where it is deflected through the combustion chamber. In case of cracks or leakage in the second or third passes, both the blast and air are by-passed, and go directly through the stoves without following their proper passages. This leads to great inefficiencies. We have experienced these difficulties in several instances.

Dust in the Stoves

A blast furnace will produce about 150,000 to 160,000 cu. ft. of gas per ton of iron, 10 per cent. of which may be assumed as loss. One-third of the remainder will be burned in the stoves for the pre-heating of the blast, while the remaining two-thirds can be divided for power purposes and used at the boilers or for driving internal combustion engines. The gas, as it leaves the furnace contains a considerable quantity of dust, some of which is deposited in the dust catcher and mains, the finer portions being carried on to the point of gas consumption. This fine dust is carried into the stove with the gas, some of it impinging on the walls of the combustion chamber, clinkering, and forming heavy masses of cinder. Quite a lot of the dust passes through the combustion chamber and lodges in the checkers and in the bottom of the stoves. Cleaning doors are provided for the removal of such dirt when its removal is possible without taking off the stove. The dirt in the bottom of the second pass is very seldom fused, and can be scraped out readily, while that which remains in the checkers must be removed by means of iron weights or dollies.

If a stove is kept on too long, the checkers may become almost entirely closed up and the stove will neither absorb heat nor give it up. A glazing effect often takes place, which will also prevent the absorption of heat, and will lower the efficiency of the stoves. It is, therefore, desirable to keep the stoves as clean as possible. With the dirty gas we are forced to remove the dirt from the cleaning doors once a day, and take the stove off for complete cleaning about once every two months, which process requires about five or six days. The stoves have a checker area equal to 9 in. square which are frequently clogged to about 3 to 4 in. square, while some of them are closed completely. This is especially noticeable on stoves having a separate stack, the checkers on the side toward the stack closing first. It is thus very evident that for one-third of the time, the furnace is deprived of one-fourth of its heating surface capacity; the remaining three stoves, during such periods of cleaning, run down very rapidly. For this reason, in a number of recent constructions, five stoves have been advocated, so that when one is taken off for cleaning, the loss of heating surface is not so essential and the furnace is less affected. The alternative is the erection of four large stoves with the greater heating surface and smaller checker opening, say 6 in. square and using washed gas.

Advantage of Washed Gas to Stoves

We have been using washed gas on four sets of stoves for about three years and at no time have we removed any stoves for cleaning. During times of suspension of operation for various reasons, we have gone into the stoves and do not find more than a coating of dirt on the top of the checkers, and in the checker walls. After a year and a half of service, one set of stoves was taken off and not more than 10,000 to 15,000 lb. of dirt removed from the entire set. The brick work in the combustion chamber, at the point of the flame impingment, showed a fused surface about 1 in. in thickness. At the bottom of the second pass was found an impalpable deposit of a pinkish color of the following analysis:

Silica	22.80	
Iron	6.00	$=Fe_2O_3$—8.57 per cent.
Manganese	1.50	$=Mn_3O_4$—2.09 per cent.
Alumina	15.73	
Lime	21.42	
Magnesia	2.50	
	20.90	Potassium Oxide
	6.08	Ignition Loss

Performance of the Gas Washing Apparatus

The gas is washed through spraying tower washers, where it is at present cooled from 350 deg. to 5 or 6 deg. above the temperature of the washing water, and the dust removed to an average of about 0.2 of a grain per cubic foot. The year 1910 showed ingoing water to have an average temperature of 55 deg. and the temperature of the outgoing gas, 72.3 deg., or a difference of 17.3 deg. We have since re-designed the scrubbers, and now show only a difference of 5 deg. between the water and out-going gas. The results are obtained with the same water consumption per minute and a greater gas volume. The moisture, which will average 30 to 35 grains per cubic foot in the raw gas, is removed down to a point about ½ grain above the saturation point, at the temperature of the gas as it leaves the scrubber,* 4 to 5 deg. above the temperature of the cooling water.

About 30,000 cu. ft. of gas are passed through each 12-ft. scrubber per minute, where it is repeatedly sprayed by means of a cut-off valve having a revolving core, the water spraying through nozzles and is broken up so as to bring it into very intimate contact with the gas. That this contact is attained, is evident by the close temperature of the gas to the entering cooling water. There are 815 gal. of water per minute used in each tower. The average since January 1, 1911, is 35 cu. ft. gas per gallon of water. There

is some dirt deposited in the clean gas main, especially at such points where the main makes a bend, and these points must be cleaned out from time to time. If the gas is insufficiently cooled, it will pick up moisture to such an extent as to make it incombustible. In some cases, on a number of stove tests which we have run, the efficiency of the clean gas stoves is about 8 per cent. higher than that of the dirty gas.

The Heating Surface in the Stoves

A comparison of stove equipments in the different plants shows a decided lack of uniformity in regard to heating surface required for different size furnaces. As an illustration, there are two modern plants, each having furnace bosh diameter of 22 ft. with 134,000 and 223,000 sq. ft. of heating surface respectively. Both furnaces should be capable of the same tonnage production. I should strongly advocate the latter figure as the better proposition, for with this heating surface, 1100 or 1200 deg. could be carried with little difficulty when furnace conditions would permit. Fire brick is a poor conductor of heat, and therefore the exposed area, or heating surface, should be as large as possible. The volume of brick work must be strong enough, however, to withstand all the strains to which it will be subjected. It is evident that with a consumption of 5000 cu. ft. of gas per minute a heating surface area too small would allow extremely high stack temperatures. This would introduce a loss which would not be present in case there was sufficient heating surface, yet at times, in order to get a high temperature in the stoves, this quantity of gas may be required.

Three Elements of Efficient Stove Operation

The average blast furnace gas requires about 0.7 cu. ft. of free air for perfect combustion. This, however, does not allow for any variation and in practice should be carried to the proportions of about one to one. The air excess in this case will be slight and the loss in heat would be small, while sufficient oxygen is practically assured to meet all requirements in fluctuation of the constitutents. It must be borne in mind that if dirty gas is used in the burner in the theoretical proportions, there is great danger of fusing the brick in the combustion chamber at the point of flame impingment. Heavy flue dirt clinker is also liable to form in the combustion well, clogging it up.

Draft should be symmetrical and uniform over the full area of the stove and the stack should be so placed and its communication to the stove should be such that this will be the effect. The feature of draft has called for considerable comment and opinion seems to differ as to the best location of the stack in relation to the stove. Some are favorable to the individual stack on the ground that the stoves are not subject to the discriminatory features of the single large stack, which is evidenced in its tendency to favor the closest situated stoves in the matter of draft intensity. On the other hand, opponents of the individual stack claim, that owing to the cooling of the stack during the period the stove is on the furnace, its influence is not properly exerted again until sometime after the process of regeneration has advanced and the stack has had an opportunity to become heated again. Too much importance cannot be attached to the necessity of having the draft symmetrical and uniform. The ill effects of not having it are many and may include such as: Local clogging in the regions where the draft is intensified; high velocity of combustion products with its consequent reduction of time contact and heating surface, intensified local temperatures producing glazing, vitrification and unequal expansion and contraction; highly heated surfaces confined to a comparatively small area and ultimately shifting the seat of operation to another point when resistance in the original path has become too great.

It might be added in passing that the superimposed stacks, those finding application in stoves of the three-pass type, seem to have eliminated the difficulty of obtaining symmetrical draft, although having the disadvantages attributable to the cooling resulting during the period the stove is on the furnace. The ills above cited are particularly pronounced in the two-pass center combustion chamber, where communication to the stack is so effected as not to be conducive to symmetry in draft.

*Other information on gas cleaning at Duquesne, and also on blast furnace gas engines, under the authorship of Mr. Diehl, and others appeared in *The Iron Age* of July 6, 1911.

Stack temperatures are dependent, first, upon the extent of heating surface; second, absorbative power and mass of brickwork; third, time contact, which is determined by the intensity of draft; fourth, the volume of the recuperative gases; and fifth, the blast. The time required by a unit volume of regenerative gases in passing through the stove will be considerably more than that required by the blast, the volume ratios of blast to heating gases averaging about four to five to one in the most approved practice. The item of stack temperature is one of the most important entering into stove operations and its influence upon the economies to be realized, not only on account of the enormous heat-losses represented by abnormally high temperatures, but the deleterious effect upon chimney valves and seats where these are not water cooled. Heat losses in flue gases have been noted, constituting as high as 35 to 36 per cent. of the total heat entering the stove in the fuel gas, which added to other losses encountered will often run up to 50 or 55 per cent. of the total heat made available to the stove.

The tendency to conservation and the rapid increase in the cost of coal, consequently coke, has resulted in accentuating effort in the economical and efficient consumption of blast furnace gas. Consequently furnacemen have turned their attention to hot blast stove construction and the economical importance of its proper design, together with a conscientious regard for the quality of material that shall enter into its construction; all of which have a direct bearing upon the value and efficient consumption of fuel gases. Considerable attention has also been directed to the cleaning of gas as a means of economy in stove practice, a number of plants having extensive washing systems in operation.

The Showing of Clean Gas for the Stoves

Careful study of different tests made have clearly revealed some advantages in the use of cleaned gas for stove purposes, among which might be mentioned the possibility of higher blast temperatures, lower fuel consumption, uniformly higher thermal efficiencies, to which might also be added the absence of stove cleaning gangs and the interruptions of service consequent upon the use of dirty gas.

Question of High Stack Temperatures

E. L. Messler, general superintendent, blast furnaces and coke ovens, Pittsburgh Works, Jones & Laughlin Steel Company, Pittsburgh, mentioned in the discussion that the changes in temperature in the brick work will be extremely violent and very hard on it. Thus, if the temperature of the waste gas is, say 500 deg., when the stove is put on blast, the brick at this point, which is close to where the cold blast enters at about 100 deg., will only be about 350 to 400 deg., or a difference of 250 to 300 deg. from the entering blast; while if the temperature is run up to 1000 deg. the difference will be about 750 to 800 deg. This extreme variation which cannot help but injure the brick in time and cause the failure of the lining at this point, may be one of the principal causes of the trouble with the domes of the three-pass stoves.

Mr. Diehl's paper, Mr. Messler added, also brings out another point very clearly, namely, that if a certain size stove, a chimney valve and a stack which are together giving a certain amount of heat to the blast when pushed to the limit, which would mean high stack temperature, be relined with brick having a greater heating surface by decreasing the size of the checker openings, a greater blast temperature will be available with greater heat economy; no change whatever being made in the burner, chimney valve or stack, as the brick will be capable of taking up more heat and the consequent outgoing gases will be lowered in temperature, the heat in the gas being absorbed by the brick and given off to heat the blast rather than wastefully being allowed to escape.

From rough calculation an increase of every 100 deg. in the stack temperature means approximately a consumption of 10 per cent. more gas with very little increase in the resultant blast temperature. The reason the same stove will give more or less heat at different times is, Mr. Messler believes, principally the change in the composition of the gas, the condition of the brick work and the length of time the stove has been on gas; and but very little to the number of cubic feet of gas that is burnt in it, considering that the proper amount is burnt when the temperature

showed the lowest. Of course, difference in the amount of wind blown through a stove makes a vast difference in the blast temperature produced by the same stove, as the less wind passing through the stove the slower it will move and the more time it will have to absorb the heat from the brick work. Another part worthy of note in stove construction is that the smaller the checker opening the faster the gas will give up its heat to the brick and the faster also the brick will give up its heat in turn to the blast.

Gas Consumption in Stoves

J. A. Mohr, superintendent, Carrie Furnaces, Carnegie Steel Company, Rankin, Pa., quoted from Stahl und Eisen, of June 22, 1911, where the statement is made that in German practice various plants estimate from 35 to 60 per cent. gas consumption for stoves, due to various types of stoves used, quality of gas, and other local conditions. With average conditions, they claim 45 to 48 per cent. consumption, with moisture in gas ranging from 8 to 12 per cent. by volume. His experience has been confined to the three-pass type of stove. By tests made on newly lined 21 x 100-ft. stoves, having a heating surface of about 47,500 sq. ft., he obtained an efficiency of 64 per cent., using ordinary furnace gas having an average analysis of 13.5 per cent. CO_2; 22.73 per cent. CO; 4.04 per cent. H_2; 59.73 per cent. N_2 and 85.666 B.t.u. The stack gases were 1.13 per cent. CO; 16.73 per cent. CO_2; 5.84 per cent. O_2; 76.30 per cent. N_2 and 3.62 B.t.u.

He affirmed Mr. Diehl's opinion regarding large heating surfaces, and would advocate no less than 200,000 sq. ft. for a 22-ft. bosh furnace, advising the use of cleaned gas for all stoves. For clean gas burning, Mr. Mohr continued, a mixing burner should be designed to mix pre-heated air thoroughly with the gas. By this means, less excess air would be required, and the combustion temperature would be higher. As yet this burner has not been developed for stove use. It seems very encouraging, in many cases to expect double the life of a hot blast stove using cleaned gas than one using ordinary dirty gas. Cleaned gas will preserve the draft of the stove, which has everything to do with its capacity, as its power is a measure of the quantity of fuel that can be consumed in the stove in a given time; hence an increase of the heat absorbed, other conditions being equal.

Individual or Central Stacks for Stoves

In regard to stacks for stoves, he does not find with three-pass stoves that the draft is impeded by the cooling of the stack during the time that the stove is on the furnace, and favors individual stacks for three-pass stoves. He considers the best and most uniform draft is obtained in stoves with a central combustion chamber and having stacks arranged central on the dome. This is quite evident from the fact that the first three-pass stoves built had side combustion chambers, and in most cases offset stacks, which were later, for various reasons, improved to the present type.

For two-pass stoves he thinks that one stack, centrally located, for one set of stoves, is more satisfactory than one for two sets, for the reasons mentioned, and would not advocate the use of individual stacks at all, because the individual stack on a two-pass stove is of necessity very much longer than for a three-pass stove, and the cooling effect would be detrimental to the draft of the stove.

Heating Surface in Stoves

The last two stoves built at Carrie Furnaces were of the three-pass Massicks & Crooke type, 22 ft. diameter and 90 ft. high. A vast improvement in the substructure of the stove was made to carry the checkers so that the pressure per square inch on the lower walls carrying the checkers was reduced 24 per cent., and checkers on the third pass were arranged to provide additional surface, the total heating surface being 50,737 sq. ft. By actual trial after having been in use a short time and using ordinary dirty gas these stoves showed a performance of 1300 deg. F. blast temperature constantly for 2 hr. by adjustment of the equalizing valve during this space of time on a volume of about 33,000 cu. ft. of air.

Mr. Mohr reports no trouble with stoves cracking between the second and third passes sufficiently to reduce the efficiency, and in general they have done exceedingly good work, being able at any time to carry from 1200 to 1400 deg. F. for 1 hr., with a drop ranging from 75 to 150 deg. The only trouble of consequence developed after a life of nine years on the 21 x 100-ft. stoves. The walls carrying the checkers began to crush and crack, due to excessive weight of checkers. This led to the improvement in the last two stoves built. He does not favor an extraordinarily high stove. Best practice is slightly larger diameter and less height, and large heating surface with the use of cleaned gas. With the increased use of Mesaba ores, efficient furnace practice demands stoves which have relatively a large heating surface, say a ratio of 1¼ sq. ft. of surface to 1 cu. ft. of air blown under normal conditions.

A. E. Maccoun, superintendent of furnaces, Edgar Thomson Works, Carnegie Steel Company, Braddock, Pa., discussed the paper in part as follows:

With some furnaces having bad distribution, badly worn lines, etc., it is found impossible to make use of high temperatures, such as 1200 or 1300 deg. F., and obtain these greater economies, but with well-proportioned furnaces in this respect, in good condition, these heats can be easily carried most of the time and the economies effected. But it must be remembered, as Bell said, that the quantity of carbon present in the furnace must always be sufficient to maintain a reducing action in the gas produced by the oxidation of the coke at the tuyeres. It is, therefore, only when the coke consumption exceeds the limit supposed to be essential for this object that the use of more heat can be beneficial to any great extent.

Mr. Diehl, he continued, gave an example of a stove 22 ft. in diameter, 100 ft. high, with 60,000 sq. ft. of heating surface. A modern blast furnace with an equipment of four well-designed stoves of this kind should have no trouble in running on a straight line heat of 1200 deg. F. and still have plenty of reserve in case it is demanded by the furnace, and the average stack temperatures from such stoves should be below 400 deg. F., and it should not be necessary to install five stoves in place of four if washed gas is used.

Preliminary Dry Cleaning of the Gas

The blast furnace gas used for stoves should by all means be washed, but it is also advisable to first take out as much dust in the dry state as possible as this is valuable material and can be used over again in the furnace. By elaborate dry cleaning alone it seems impossible to get the gas much below 0.5 grain of dust per cubic foot. It is advisable to carry the dry washing far enough to take out the greater part of the coarser dust and cool the gases to some extent. After this it looks as if the spray type washer is the simplest and most efficient type for primary washing to remove the very fine dust. This, of course, means that the gas must be cooled down to at least 90 deg. F. to prevent excessive moisture being carried over into the stoves.

The 8 per cent. gain in efficiency, which also allows for the loss in sensible heat by washing and which was obtained on similar stoves with the same size checker openings, that Mr. Diehl mentions as resulting from the use of washed gas, is not at all representative of the actual gain to the blast furnace by the use of washed gas. With washed gas, smaller checker openings can be used and greater heating surface obtained, we do not blow the amount of dust through hot blast valves, pipes, tuyeres, etc., and they are not cut so badly nor is nearly the amount of costly repairs required on this equipment or on the linings of the stoves themselves. We can also get perfect combustion with clean gas and have a uniform heat at our command at all times for the blast furnace. These results would be an impossibility to obtain with dirty gas, due to its filling up the stove wells with clinker which is nearly impossible to remove and which injures the walls of the combustion chambers and the efficiency of heat absorption and of the entire brick work of the stove.

Economy of High Stove Temperatures

C. S. Forkum, superintendent of furnaces, Aliquippa Works, Jones & Laughlin Steel Company, Aliquippa, Pa., contributing to the discussion, mentioned that the Germans have made a table in which they give a value in pounds of coke per ton of pig iron for each 100-deg. increase in temperature above 1000 deg. From 1000 to 1100 equals 50 lb. of coke; 1100 to 1200 equals 40 lb. of coke; 1200 to 1300 equals 30 lb. of coke; 1300 to 1400 equals 20 lb. of

coke. There is reached, however, a point in the neighborhood of 140 deg. above which it is not advisable to go because the saving in coke does not offset the wear on stoves accompanying the intense heat and furthermore it becomes necessary to burn so much gas to maintain an additional 100 deg. in the stoves above that temperature, that in comparison to the benefits derived, it is found to be more economical to use the gas for other purposes.

Experience has shown that clean gas is more beneficial to furnace operation than dirty gas. He had found that 1300 deg. can be carried very nicely on stoves that have never used dirty gas, and about 1100 deg. is about the limit for stoves using dirty gas. A stove operated on dirty gas for two months barely yields 900 deg. If we calculate the difference in heat absorbed by 45,000 cu. ft. of blast per minute at 1300 deg. and at 1100 deg., it shows an efficiency of 16 per cent. higher in the one case than in the other, both stoves using the same amount of gas. Stoves tested at one plant show 47,744 cu. ft. gas per ton iron used in the stoves. The saving by having cleaner stoves, would amount to 7701 cu. ft. of gas per ton iron. This gas, assuming 90 B.t.u. per cubic foot, when used under boils of 50 per cent. efficiency will transfer to the boilers 346,545 B.t.u. If we assume a value under the boilers of 7200 B.t.u. per pound of coal then this is equivalent to 48.1 lb. of coal and at $1 per ton to 0.0215 cent per ton of pig iron.

At one plant using a Mullen washer the labor for cleaning stoves amounted to 60 hr. per week or $9.60, and at another furnace not equipped with a gas washer was 120 hr. or $19.20. The efficiencies of the stoves were maintained about equal. The saving in labor, if this cleaning could be done away with, would be 0.0035 cent in the case of the Mullen washer and 0.0071 cent in the other, figured on an output of 450 tons of pig iron per day. These savings though small, if added together would amount to quite a reduction in cost of manufacture.

Heat Production from Shells of Stoves

J. W. Dougherty, president, Pittsburgh Crucible Steel Company, Oliver Building, Pittsburgh, regarded it as a mistake to claim that a modern furnace should be equipped with five stoves. If a furnace is equipped with four stoves properly designed and properly built, there is no doubt, he said, that 1400 to 1500 deg. F. can be obtained in the blast continuously, should the furnace be able to use this high blast temperature. With a mixture consisting mainly of hard hematites or magnetites, there is no doubt but that 1400 deg. can be used continuously, for this temperature of blast is the common practice in German blast furnaces.

He did not think blast furnace engineers have given the question of the heat radiation from the outside of the steel shells of the stoves as much consideration as the subject deserves. With five stoves, as at present constructed, there is, without doubt, more heat radiated from the outside shell of the stove; the more stoves, the more heat lost in radiation, and for this reason, if three stoves were properly designed, particular care being used to see that the combustion chambers were sufficiently large, and built to contain the total amount of fire brick heating surface which is contained in five stoves, as at present specified, and if the three stoves were erected with a satisfactory non-conducting heat material on the inside of the shell to prevent the heat getting to the shell, maximum of economy would be secured in the use of blast furnace gases for heating the stoves.

The question of placing an auxiliary chamber on the outside of each stove, in his judgment should be considered, if gases containing much dust are used. His idea is that a portion of the gases should be burned in this chamber; the other portion being burned in the main combustion chamber, and that no combustion takes place in the top of the checker work. With the auxiliary chamber when the gases are first burned, a good portion of the dirt contained in the gas is dropped in the chamber and it is a much easier matter to clean this chamber than it is to remove the dirt from the top of the checkers. The auxiliary chamber can be cooled off very readily in a half day, whereas, if it has to be removed from the top of the checkers, especially in three-pass stoves with the draft stack on the top of the stove, it will be four or five days before the stove will be sufficiently cool to permit a man getting into the top to work safely.

R. W. H. Atcheson, superintendent of furnaces, Bellaire Works, Carnegie Steel Company, Bellaire, Ohio, stated that for the benefit of those present who have had limited experience with actual blast furnace operating conditions, it seems it might be well to emphasize what has already been said comparing two-pass and three-pass stoves; that the chimney valves in three-pass stoves are a source of almost constant air leaks since they are suspended in the direct path of the hot stack gases while the external chimney valves on the average two-pass stove are easily kept tight. Another decided advantage of the two-pass is the accessibility of all checker work from the outside of the stove. By removing the side doors on top of the stoves the checkers can all be cleaned without going inside the stove.

Pamphlet on Aligning Shafting and Machinery

The alignment of shafting and machinery which has been made the subject of a special study by Geo. W. Loggie, treasurer of the Kinkead Mfg. Company, 7 Water Street, Boston, Mass., is covered in part in an illustrated pamphlet of 34 pages prepared by Mr. Loggie for general distribution. It reprints a paper read before the National Association of Cotton Manufacturers and reviewed at length in *The Iron Age* at the time. The issuing of the pamphlet now gives an opportunity for those interested to get the paper in its entirety, as it can doubtless be had for the asking, and it will serve to indicate what and how large has been the saving in a number of specific plants of a proper readjustment of the shafting and machinery. The illustrations not only show the special target employed and give an insight into the method of ameliorating plant conditions, but include diagrams of the different conditions found in different plants.

Scrap in the Talbot Process

Benjamin Talbot, Middlesbrough, England, writes as follows to the London Iron and Coal Trades Review concerning a statement in that paper implying that when scrap is used in conjunction with the continuous bath in an oven-hearth furnace this is not carrying out the Talbot process:

"This is, of course, entirely an error, as Jones & Laughlin have used, and are using, many thousand tons of scrap in their tilting furnaces at their existing works at Pittsburgh, and we also are doing the same at the Cargo Fleet Works here, where at times the use of scrap has run up to 50 per cent. of the charge. So long as any one is using liquid iron, with or without scrap, and without emptying the furnace after each heat, he is using the Talbot process. The question of the use or non-use of scrap in the process is entirely a commercial one, and we believe we can use scrap in this process to better advantage than when it is charged in fixed furnaces and emptied at the end of each heat."

The Merchants' and Manufacturers' Insurance Bureau has been organized in Indianapolis, Ind. John W. Williams, recently with the General Adjustment Bureau, Buffalo, N. Y., and formerly Indiana agent of the Prussian National Fire Insurance Company, has been appointed manager. It will look after the fire insurance interests of members, keeping risk surveys, records of rates, premiums paid, loss claims settled, etc. It will aid members in the adjustment of losses, study causes of fires, etc. The present membership consists of 200 local merchants and manufacturers. It is said to be the first organization of the kind in the country.

The Atlantic Radiator Company has removed its executive offices to 925 Chestnut street, Philadelphia, Pa. Its plant at Huntingdon, Pa., is running at full capacity, and additional equipment is being installed as rapidly as possible to take care of the growing trade.

The Joseph Dixon Crucible Company, Jersey City, N. J., has put on the market a new chain graphite, especially intended for lubricating the chains of motor trucks and pleasure cars. It is put up in sticks, cylindrical shape, 2 x 8 in., in a cardboard carton, and weighing about 1 lb. each. It is made of the same material as the Dixon bicycle stick graphite with which bicycle owners are familiar.

An Improved Spiral Relieving Attachment

Details of a New Development of the Hendey Machine Company, Torrington, Conn.

For a number of years the Hendey Machine Company, Torrington, Conn., has been manufacturing a relieving or backing-off attachment for use in connection with its 14, 16 and 18-in. lathes. To secure greater application and results, it is now offering an improved design of attachment which is practically universal in its scope. The use of this attachment enables not only all the ordinary forms of relieving obtained with the earlier design to be duplicated, but in addition taps and hobs with spiral flutes can also be relieved. In this way the advantage of spiral over straight flutes in tools of this character with a coarse lead which gives the tool a cutting edge that is square with the body of the tooth and properly balanced, thus enabling the tools to cut better and faster, is secured. Fig. 1 is a view of the attachment applied to one of the builder's standard lathes, while the attachment separated into its various parts is shown in Fig. 2. Four different applications of the attachment are illustrated in Figs. 3 to 6, being the relieving of counterbores, internal work, formed cutters and a spirally fluted hob, respectively.

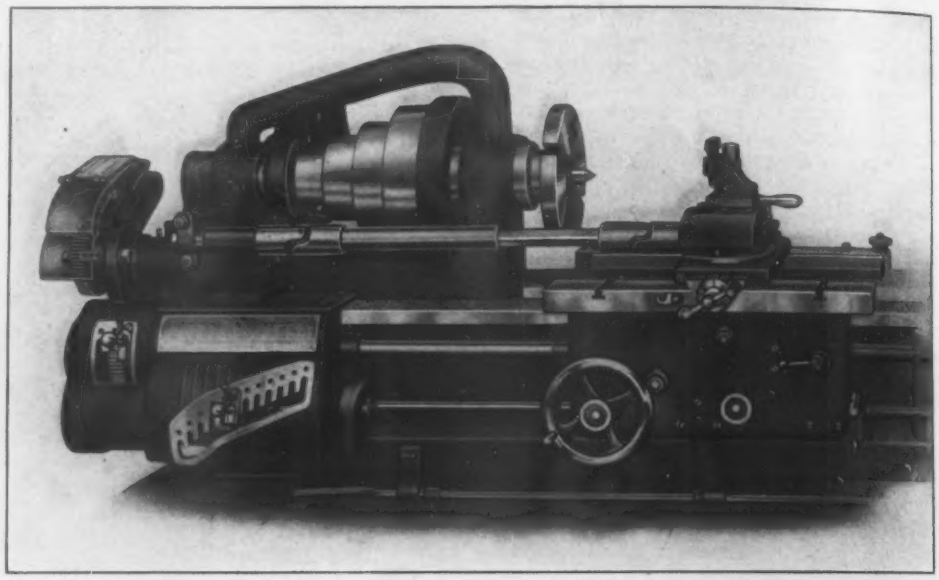


Fig. 1—A Lathe Equipped with the New Type C Relieving Attachment Made by the Hendey Machine Company, Torrington, Conn.

The actuating mechanism of the attachment is mounted on the main gear box, displacing the tool pan or cover. The tool slide interchanges with the compound or other rest on the top of the cross slide and incorporates the natural advantage of the swiveling feature on the slide to secure suitable positions for side and end reliefs. The placing of the complete attachment in position, as shown in Fig. 1, occupies but a very few moments.

It is frequently desirable to change the amount of relief from one type of cutter to another and this is accomplished in a simple and easy manner by providing the ends of the oscillating shaft and cam lever with a toothed coupling that enables the position of the eccentric on the tool slide to be changed with reference to the cam lever, thus lengthening or shortening the reciprocating travel of the tool.

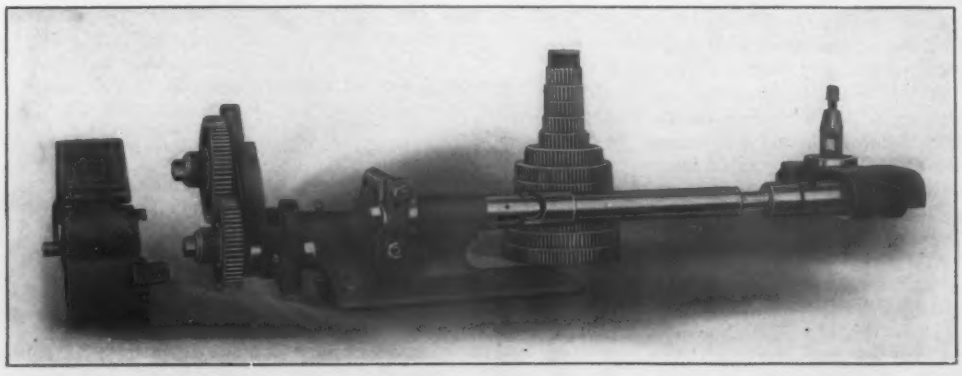


Fig. 2—The Attachment Disassembled

In this way it is possible to secure a range of motion ranging from 0 to approximately 5/32 in. on the 14, 16 and 18-in. tools, while on the 20 and 24-in. lathes the limits are 3/16 and ¼ in. respectively.

Applications of the Attachment

When counterbores are to be relieved this can be done by employing an additional universal joint and bearing to permit the tool slide to be swung to a 90-deg. angle as is illustrated in Fig. 3. When the attachment is used for inside work on hollow mills and threading dies, an example of the later being shown in Fig. 4, the eccentric controlling the travel of the tool slide is set so that the relieving is done away from instead of toward the axis of the cutter. This change is accomplished at the toothed coupling of the cam lever and the oscillating shaft, rolling the latter beyond the zero mark in a clockwise direction as much as is necessary to get the desired amount of travel in the tool slide. For doing this class of work it is also necessary to change the position of the opposing spring in the tool slide so that it will press against the end of the slide and prevent the tool from jumping into the work then in the cut.

In relieving formed cutters such as the one illustrated in Fig. 5 it is emphasized that the attachment can be used to material advantage. Frequently special shapes are wanted which are not listed in cutter catalogues and to have them manufactured outside is not only costly, but is also apt to result in delay in delivery. With a relieving attachment cutters of this type can be made as they are wanted, the attachment thus becoming a factor in the production of tools which maintain manufacturing efficiency. The working speeds at which cutters of this character are relieved are of necessity slow, the width of cut taken being the governing factor.

In relieving spirally fluted hobs like that shown in Fig. 6 the pitch of the spiral and the gears required to drive the attachment are first selected. After the attachment is properly geared to suit the spiral and the number of flutes the main screw is engaged and the backing-off process proceeds as for straight flutes, care being taken not to disengage the lead screw, but to reverse the carriage by power, the lever at the right of the apron being employed for that purpose, instead of running it back by hand.

In using the attachment the maker recommends that the work revolve much slower than for turning so as to give the tool slide time to operate properly. The maximum num-

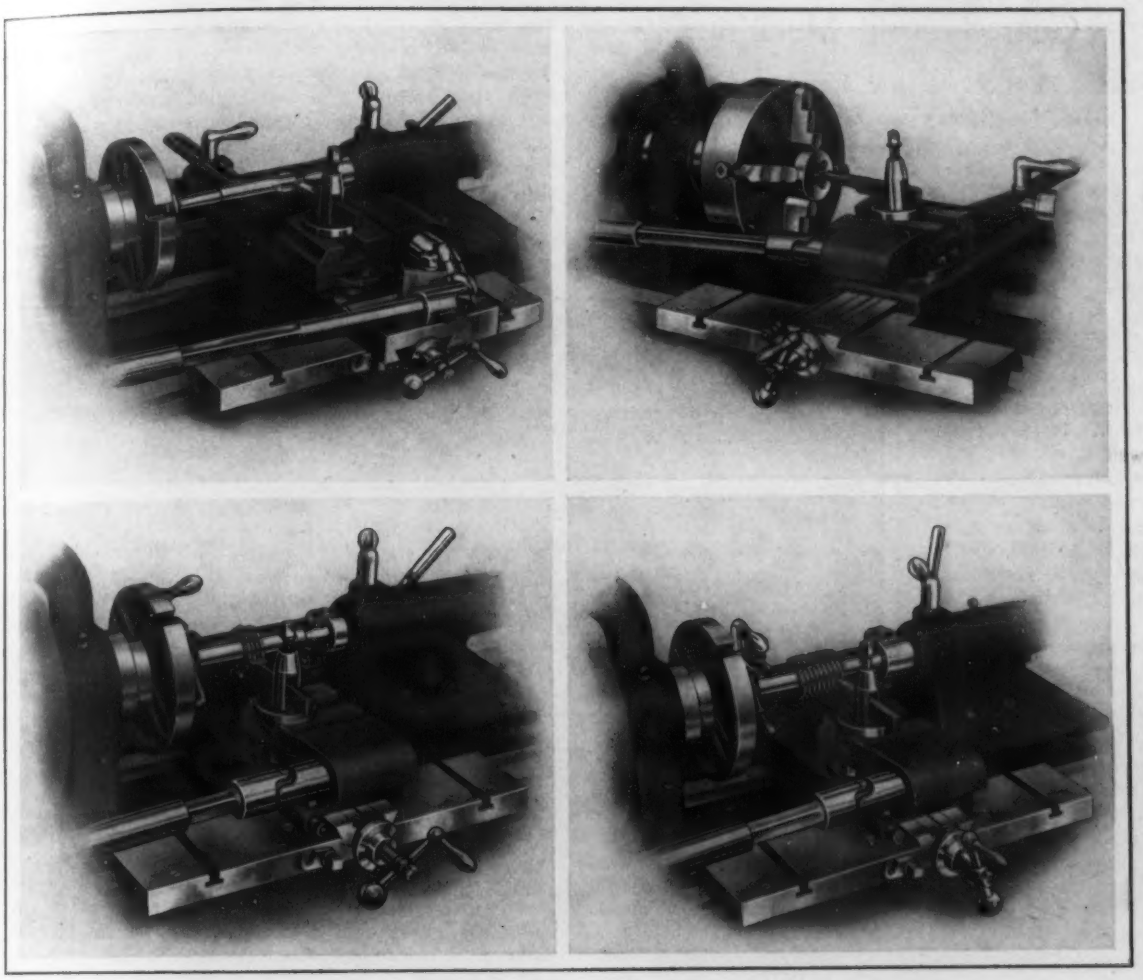


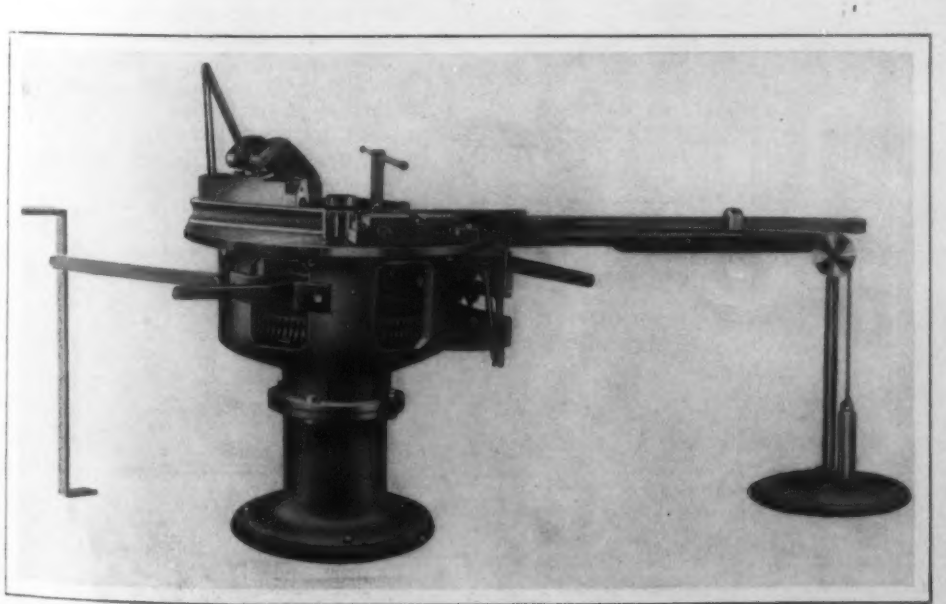
Fig. 3—Relieving Counterbores
Fig. 5—Relieving Formed Cutters
Fig. 4—Inside Relieving
Fig. 6—Relieving Spirally Fluted Hobs
Four Different Applications of the Attachment

ber of teeth to be relieved per minute is 180 and in cases where wide forming tools are used it is desirable that the speed be reduced in some cases to as low as eight teeth. The tool should have a keen edge and the slide should act freely without unnecessary looseness in the dovetail. A plan recommended is to color the cutter after it has been formed either by heating or by dipping it in a strong solution of copper sulphate. This will enable the operator to see the result of the work plainly and stop relieving at the proper time. After backing off remilling insures a sharp edge and less grinding after the cutter has been hardened.

The Simmons Pipe Bender

The accompanying illustration presents the Simmons bending machine for bending brass and steel pipe. The machine is built with capacity for bending brass tubing up to 3 in. in diameter and steel tubing up to 2 in. in diameter. Leverage is secured through a worm gear driven by a friction clutch. The machine is fitted with removable dies for bending the various sizes of pipe. The dies fit into a square bar which permits a rapid interchanging of sizes and the lever controlling the clutch is conveniently located so that a manipulation of the tubing and the pulling back of the dies is a simple operation.

The machine is built by the Frank L. Wells Company, Kenosha, Wis., and weighs 1500 lb.



The Simmons Pipe Bending Machine for Brass and Steel Tubing Built by the Frank L. Wells Company, Kenosha, Wis.

At the annual meeting of the Reading Iron Company, held at the Reading Terminal, Philadelphia, Pa., February 14, the following directors were elected: George F. Baer, F. C. Smink, E. T. Stotesbury, Samuel R. Seyfert and Heber L. Smith. They elected these officers: Chairman, George F. Baer; president, F. C. Smink; vice-president and general manager, George Schuhmann; secretary, George W. Delaney; treasurer, Frederick Butler.

Gear Testing Machine

A Recent Product of the Peerless Gear Tester Mfg. Company for Measuring Spur and Bevel Gears

A new gear tester for determining the concentricity, pitch diameter and variation in the tooth thickness of spur and bevel gears has been recently brought out by the Peerless Gear Tester Mfg. Company, 602 Schofield Building, Cleveland, Ohio. The machine is the invention of R. L. Swartz, the vice-president of the company, and is being placed on the market by Manning, Maxwell & Moore. The tester, which shows the running center of the gears, has a capacity for gears up to 18 in. between centers, and if desired it can be supplied for testing gears of larger sizes. An attachment for testing bevel gears is also provided. A top view of the machine is given in Fig. 1, while Fig. 2 shows the general details of its construction.

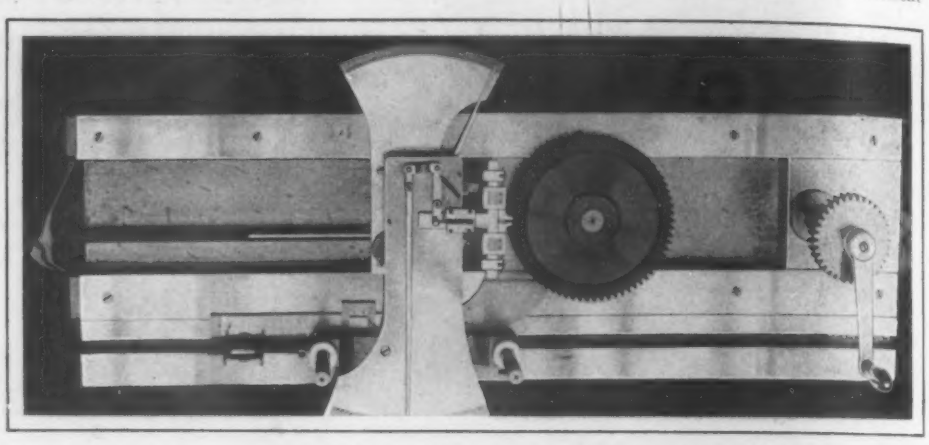


Fig. 1—A New Tester For Measuring the Tooth Sizes and Pitch Diameters of Gears Made by the Peerless Gear Tester Mfg. Company, Cleveland, Ohio

The machine consists of a base forming a horizontal table, a stationary and a movable block in which are placed hardened and ground studs on hardened steel bushings and the necessary mechanism for transmitting the motion caused by inaccuracy in the gear being tested through multiplied lever movements to pointers swinging over graduated dials. The machine is 37 in. long, 12 in. wide and 3 in. deep. The base is of cast iron and is ribbed underneath to give strength and also to prevent warping. Machine steel plates which provide a runway for the movable block and also for the testing mechanism are attached to either side of the base by screws.

In use the tester can be placed on a bench or in any other position which is most convenient for the operator. To find the concentricity of a gear, a master gear is placed on the stud *a*, Fig. 2, which fits in a hardened bushing in a stationary block. The gear to be tested is then placed on a stud that fits in the hardened steel bushing in the movable block, different sizes of studs being provided to fit the different bores of the gears at the upper end and are 1 in. in diameter at the lower end to fit in the bushing. By varying the position of the movable block the master gear and that undergoing test are brought into mesh and the pointer *b* is adjusted to coincide with the zero point on the indicator plate *c* by a screw, *d*, and two sensitive adjustment nuts *e*. When the gears have been brought into mesh they are held there by springs *f* that slide over screws *g* which are attached to the movable block. By turning a crank in the stud upon which the master gear is mounted any inaccuracy in the concentricity causes either a backward or a forward movement in the movable block and this is conveyed through a multiplied lever arrangement to the pointer passing over the dial, which is graduated to read to 0.0001 in. If the gear is concentric the hand will stand still when the crank is being turned.

When it is desired to find the variation in the size of the teeth on the pitch line, and also to ascertain if the pitch diameter is correct, the master gear is taken out of mesh with the gear being tested. The master gear can either be removed from its spindle or allowed to rest on top of the key on the master gear spindle. A double vernier tooth caliper is set to the thickness the tooth should have on the pitch line by adjusting screws attached to each jaw. A carriage carrying this caliper is adjusted on the scale *h* to half the pitch diameter of the gear. This carriage slides in a T-slot and is fastened by lock nuts. The sensitive adjusting device is connected to the carriage which makes the adjustment of the vernier easy and the block which holds the gear being tested and the carriage also have vernier scales. When the necessary adjustments have been made, the double vernier tooth caliper which is supported on studs is dropped on the tooth that is being tested. If the tooth thickness on the pitch line is the correct dimension the pointer *i* will rest at zero on the dial *j*. Variations are indicated by the pointer of the dial through a multiplied lever arrangement, the pointer moving above zero if the tooth be too large and below if it be too small. These readings are also in thousandths of an inch. The first tooth tested is marked and the others are measured in the same way, the position of the pointer being noted in each test. In this way the accuracy

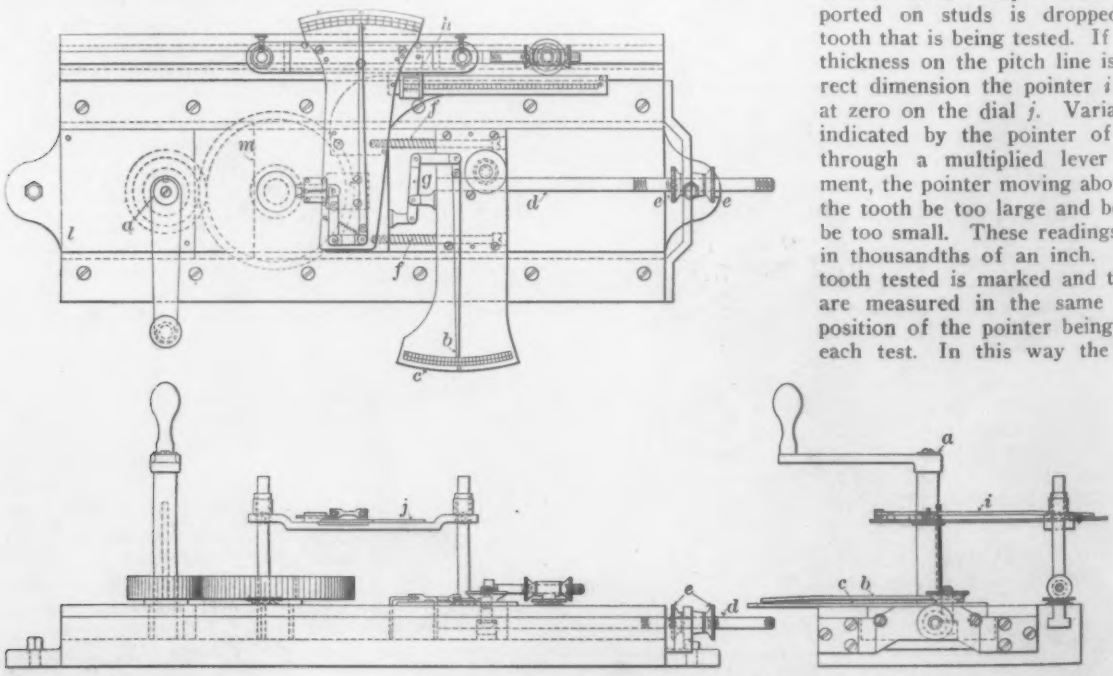


Fig. 2—View Showing Constructional Details.

of the pitch diameter is ascertained as well as any variation in the size of the teeth.

To get the running centers of gears an extra vernier scale which is adjusted to the stationary block *k* and a vernier plate which is adjusted to the movable block *l* are used. After the studs are adjusted by the vernier to the corrected running center distance the gears are placed on the spindles to ascertain if they will run smoothly.

For testing bevel gears the mechanism for testing the pitch diameter of spur gears is removed and another attachment with a similar double vernier tooth caliper which can be set to any angle for measuring any bevel gear is substituted.

Bench Lathe Attachments

For use in connection with its bench lathe, which was illustrated in *The Iron Age*, March 30, 1911, the Remington Tool & Machine Company, 50 Congress street, Boston, Mass., has recently developed two grinding attachments. Both of these are intended for external work, the one illustrated in Fig 1 being designed for grinding with wheels measuring 4 in. in diameter and ½ in. across the face, while the other attachment shown in Fig. 2 is intended for the grinding of irregular forms without the necessity of resetting for the different angles of the piece.

The external grinding attachment shown in Fig. 1 was developed with a view to securing a high degree of rigidity when wheels 4 in. in diameter and having a ½-in. face were used. Although primarily designed for external grinding this attachment can also be used for internal work by removing the grinding head regularly furnished and substituting one intended for internal work. When used on the latter class of grinding the maximum speed of the spindle is 30,000 r.p.m. Taper grinding can also be done, as the circular swivel base is graduated in degrees. The lever movement is somewhat novel, as it can be adjusted for quick short strokes in addition to longer ones.

Adjustable stops are provided for the top slide the movement of which has a range of 8 in. for work to be ground. The cross movement is 7 in. from the center. The small lever over the micrometer feed screw is intended to release the feed, and the grinding head can be instantly carried away from or returned to the work by the employment of a lever-operated rack and pinion. This arrangement, it is emphasized, greatly facilitates the fitting of ganges and the replacing of the work. The attachment can also be used for wet grinding, since the emery wheel is covered, as shown, and has an adjustable tube to direct the flow of water.

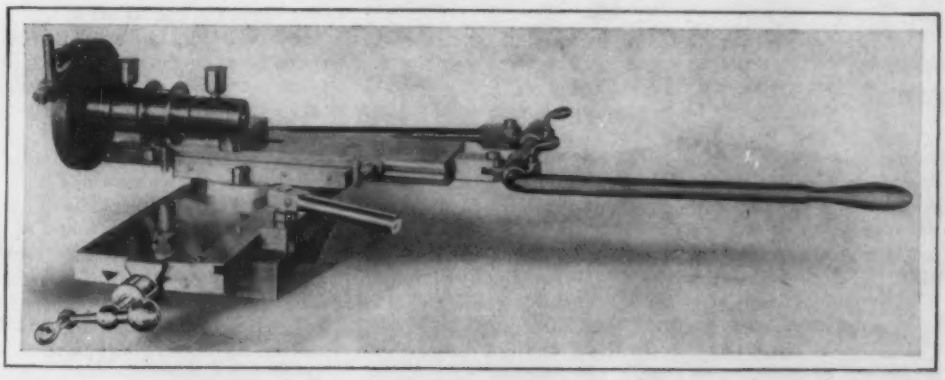


Fig. 1—An External Grinding Attachment for Bench Lathes Made by the Remington Tool & Machine Company, Boston, Massachusetts.

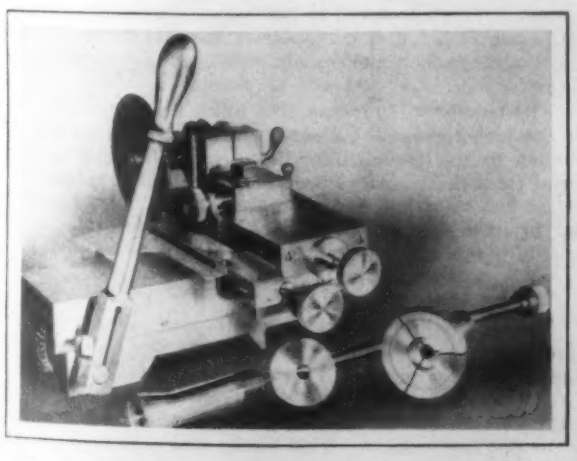


Fig. 2—A Special Grinding Attachment for Irregular Forms

The second external grinding attachment, which is illustrated in Fig. 2, is intended for grinding irregular forms without the necessity of resetting the wheels for the various angles. It is particularly adapted for grinding hardened steel paper cutters, and one of these is shown in the engraving which has been ground in three different ways, plain, concave and bevel in one setting. Fine adjustments for the cutting wheel and also to compensate for wear have been provided throughout, and a circular swivel base graduated in degrees assists in setting the wheels for the various kinds of work handled.

Bids Asked on Ingot Iron Pipe

Ingot iron is named as one of three kinds of iron pipe on which bids are to be taken March 13 for the outlet conduit for a sewage disposal plant for Rochester, N. Y., E. A. Fisher, city engineer. Tenders are asked on steel pipe, ingot iron pipe and cast-iron pipe, all 66 in. in diameter, 2200 ft. in open trench and about 7000 ft. submerged in Lake Ontario to the outfall point. The specification for the steel plate allows the following limits: phosphorus, 0.04 per cent.; sulphur, 0.04 per cent.; silicon, 0.04 per cent., and manganese, 0.4 per cent.; 20 per cent. of top of ingot to be rejected; tensile strength, 52,000 to 62,000 lb. per square inch; elastic limit, 30,000 lb. per square inch; elongation not less than 25 per cent. longitudinally of the plate and 22 per cent. transversely and reduction of area not less than 50 per cent. The corresponding requirements of the ingot iron, expressed as being of the grade known as American Ingot iron, are that it shall not contain more than 0.02 per cent. carbon; 0.08 per cent. manganese; 0.025 per cent. sulphur; 0.012 per cent. phosphorus; a trace of silicon and a total of these five impurities of not more than 0.12 per cent.; a tensile strength of 47,000 to 52,000 lb. per square inch; an elastic limit not less than 60 per cent. of the ultimate strength; the same elongation as the steel plate but a reduction of area not less than 60 per cent. The plates are all to be ½ in. thick bent into cylinders 6 ft. long.

Saskatchewan Wants Steel Rails Free

By a unanimous vote the Legislature of Saskatchewan, Canada, has passed a resolution calling on the Dominion Government to suspend the duty on steel rails coming from the United States or the United Kingdom, such suspension to hold until the supply of Canadian made rails is sufficient for the requirements of railroad construction in Canada. In support of the resolution various statements were adduced to the effect that railroad construction is being held back because of the lack of rails. The Dominion Government has also heard from the Dominion Steel Corporation on the subject. M. J. Butler, general manager, sent a dispatch to Ottawa controverting the allegations made, as follows: "We have had no requests for quotations from Western buyers for any large quantities of steel rails for this year's delivery."

Sintering and Briquetting Flue-Dust*

The Various Processes of Utilizing a Waste-Product of Blast Furnace Operation

BY FELIX A. VOGEL, NEW YORK, N. Y.

With the increasing use of fine ores, larger furnaces and high-pressure blast, the production of flue-dust is constantly increasing, and amounts annually in the United States to 3,000,000 to 3,500,000 tons, an exceedingly high tonnage, of which a large part has been discarded as valueless. It is generally a fine material containing considerable coke and iron ore, with a small admixture of lime and silica, depending upon the burden. The iron ore is partly reduced, which shows that it originates largely from the reducing zone of the blast furnace. In the United States the dust usually contains 20 per cent. of coke and more than 40 per cent. of iron. Estimating coke to be worth $3.25 per ton, and iron ore 7 cents per unit, a ton of flue-dust, unless made available, represents a loss to the furnaceman of $3.50 per ton. This accounts for the first efforts to re-charge the flue-dust into the furnace, either by moistening it down with an excess of water, or mixing it with clay to form balls or pulp, or treating it with lime-water.

Conditions in Utilizing Flue-Dust

To recover, in the blast furnace, all the values represented by the material contained in the flue-dust, the following conditions should be complied with:

1. The dust should be agglomerated into lumps about the size of furnace-coke, so that it will help to carry the burden and facilitate the flow of the gases.
2. The agglomerated material should be strong enough to carry the burden without disintegrating; it should be heavy so as to decrease its volume, and it should be sufficiently porous to permit the furnace gases to penetrate fully. Under no condition should the surface be glazed.
3. It should contain all of the valuable constituents of the dust, such as coke, iron ore, lime, etc.
4. It must stand handling, without undue breakage, and should not produce more than 5 per cent. of dust.
5. It must stand the weather.
6. It must not disintegrate in the blast furnace before being greatly or totally reduced.
7. It must submit to easy reduction without requiring additional fuel.
8. It must not contain substances detrimental to blast furnace operations.
9. Its cost of production must be low.

Blast furnace operations, by the use of such agglomerated material, will result in: (1) Regular steady operation; (2) Increased burden, increase in the yield and metal produced; (3) Decrease in the consumption of coke; (4) Decrease in the production of flue-dust; (5) Decrease in the cost of producing pig iron.

Different Agglomerating and Sintering Processes

A number of processes have been evolved in the United States, generally known as agglomerating and sintering processes. They are based on fritting together the particles of ore by heat, the binding action being due to the formation of silicates, mostly if iron. When the coke has not been eliminated mechanically from the dust, it is burned out, leaving ashes in the agglomerated material, which increases the formation of silicates of iron or glazing material. In some cases, however, more fuel is added to the flue-dust, which, naturally, further increases this drawback.

The nodulizing process, the oldest process in the United States, has been in successful operation for a number of years. Flue-dust is treated either directly, or it is previously submitted to a magnetic separation to eliminate coke and lime. This is done to facilitate the subsequent nodulizing operation, which is carried on in a slowly rotating cement kiln from 80 to 120 ft. long. From 200 to 300 lb. of finely powdered coal is used per ton of finished material, the coal being blown into the kiln. Gas and oil have also been tried with more or less success. The heat produced is considerable and difficult to control, the semi-soft material formed consisting of iron ore particles and slag, which, by the revolving action of the kiln, is balled together in nodules of various sizes—from a pinhead to that of a cannon-ball—which are usually quite dense, often fused and glazed. They contain 60 to 67 per cent. of iron, which makes them quite attractive from the furnaceman's point of view. To make nodules an elaborate and expensive plant is required, the operation of which is more or less difficult and costly.

The Huntington-Heberlein pot process, which has been used with good results in the roasting of pyrites cinders, has been recommended for the fritting of flue-dust. The resulting fritted material is of more or less cellular structure. However, this would not be an advantage, as the surface would be largely glazed, rendering it not permeable to gases, and would have to be removed in the blast furnace at about smelting heat. The process is somewhat simple, requiring stationary iron pots fitted with a perforated false bottom through which the air is blown into the charge. The equipment is cheap; the operation, however, is not continuous, which makes it expensive.

One of the Briquetting Processes

The Groendal briquetting process has also been applied to flue-dust. The flue-dust, either moistened, or after the elimination of the coke and stone, is pressed into bricks which are subsequently fritted in high temperature. To facilitate the operation it was found necessary to eliminate the coke; this, however, increases the cost. The separated coke is of little value, since it contains many impurities. The presses used are ordinary brick presses. The bricks are carefully placed in layers on cars, which are run into long kilns about 170 ft. long, where they are submitted to high temperature, gas being used for the purpose. The platforms of the cars are built of fire-brick and form the bottom of the kiln. The highest temperature, about 1300 or 1400 deg. C., is reached in the center of the kiln, the highly burned briquettes working gradually towards the cooler end of the kiln, where they are finally unloaded. The operation lasts about 7 hours. The resultant briquettes contain from 65 to 70 per cent. of iron with practically no impurities, these having been eliminated. No ashes are left by the fuel. The briquettes are only slightly fritted, are very porous and friable, and make a high-class material for use in an open-hearth furnace. The manufacturing of Groendal briquettes is expensive, necessitating a costly plant, which has limited output. A ton of flue-dust will produce about two-thirds of its weight in briquettes.

Quite recently the Dwight-Lloyd process has been applied to the sintering of flue-dust. The material is submitted to internal combustion in layers of from 5 to 7 in. thick. It is fed on an endless conveyor formed of iron pallets or grates. After the fuel therein contained has been ignited by means of a gasoline torch, or some other device, the air is drawn through by suction. The operation lasts about 20 minutes. A good deal has been published of late in regard to this process. It is claimed that the required plant is not costly, while the operating expenses are considerably lower than in the previous process. The resultant sintered material is not homogeneous and, while a large portion of it is of cellular structure, it is glazed on the surface, which makes it quite difficult to reduce in the blast furnace.

The Greenawalt process uses much the same apparatus as the Heberlein pot, but air is drawn through the charge similar to the Dwight-Lloyd process. The sintered material from these various processes is expensive on account of the loss of carbon and, with the exception of the Groendal briquette, is not of good physical structure and is usually glazed on the surface.

Briquetting for Flue Dust

The briquetting of flue-dust has been more attractive abroad than has the sintering. The lime process mixes the flue-dust with from 5 to 10 per cent. of hydrate of lime and, after briquetting, the material is exposed to the air for a certain length of time, so that a carbonate is formed which is the binding medium. This binder will eventually act as flux and replace a certain amount of stone. The process, while having decided advantages, is quite cumbersome and costly, as the briquettes must dry from two to four weeks under cover.

The pioneer process uses sulphide pitch (obtained from the sulphide pulp mills) as a binder. It is an organic sub-

*Paper substantially in full presented at the recent meeting of the American Institute of Mining Engineers.

stance, rich in carbon and hydrocarbons, which will burn readily and thus increase the calorific value of the material. The flue-dust is pressed into briquettes with 4 to 8 per cent. of sulphide pitch; they are quite hard and give fair results, but the process is expensive.

The Ronay process does not use a binder. The flue-dust is submitted to a very high pressure in a specially constructed type of hydraulic press; the resulting briquettes can be handled immediately and have proved very satisfactory. The process requires an expensive plant, however, increasing the operating-cost.

The Schumacher process does not use what may properly be called a binder, but is based on the latent cementing actions existing in fresh flue-dust and which are made active by the presence of a small amount of a catalytic substance. Thus 0.25 per cent. of magnesium chloride mixed with fresh flue-dust and 6 to 10 per cent. of water, pressed into briquettes, will create a strong reaction, noticeable by the considerable heat developed; the briquettes will be perfectly set and hard within a few hours. The process is very simple, an ordinary pug-mill being used in which to mix the material, which is subsequently pressed into briquettes in a toggle-press and then loaded on cars to allow them to set. Some flue-dust will react so strongly that a large amount of ore or coke-breeze may be added to the briquettes; in these cases the flue-dust acts as a binder.

The Schumacher process requires an inexpensive plant and the cost of manufacturing is low. It is extensively used abroad and has replaced some of the other methods. The briquettes of all-agglomerated materials have given most satisfactory results abroad and highest returns and values to the blast furnace operators.

High Speed Material Trolleys

At Texas City, Tex., are located the large warehouses of the Texas City Transportation Company, where a heterogeneous assortment of material ranging from bales of cotton to pig iron is constantly being received or shipped. For handling this miscellaneous material rapidly and economically the Pawling & Harnischfeger Company, Milwaukee, Wis., has designed and built a special type of high-speed trolley. Fig. 1 is a general view of the trolley, while a detailed view of the hoist is given in Fig. 2.

Fig. 1—A High Speed Trolley for Handling Miscellaneous Material Built by the Pawling & Harnischfeger Company, Milwaukee, Wis.

The trolleys are of the man-riding type, that is, they carry a cage for the operator, and the rate of travel is about 700 ft. per minute. They are also of the inside-running type and operate on a plate girder cantilever arm which can be moved longitudinally over the boat to a distance of about 60 ft. beyond the face of the dock. This peculiar construction was adopted since it is practically impossible to move a hinged apron of the ordinary construction through the rigging of large sailing vessels, such as these machines frequently have to serve either for the purpose of loading or unloading, and for that reason the extension of the cantilever is necessary to reach lighters tied up on the outside of the larger vessels lying there.

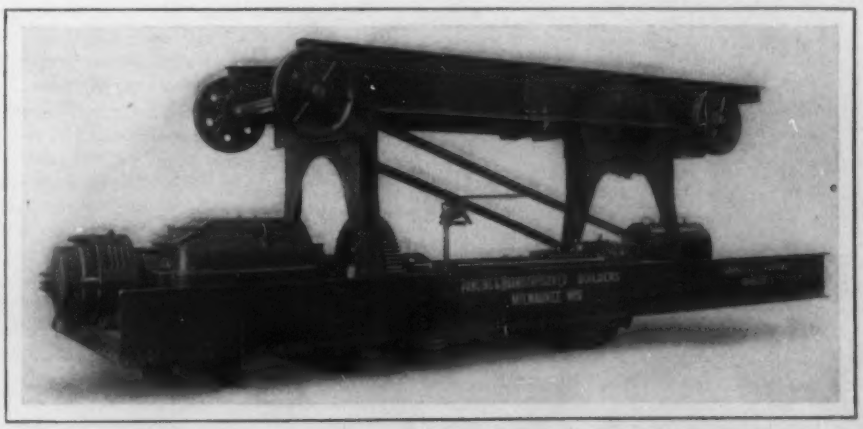


Fig. 2—Detail View of the Hoist

The special features of the hoisting mechanism, which is illustrated in Fig. 2, are the arrangement of parts for removing the hook from the hoisting rope and slipping the rope into a one-line grab bucket of the latch-open type and the arrangement of the rope guards on the bucket so that they can be readily opened and the hoisting rope, which also performs the function of the closing line of the bucket, easily inserted. A novel feature of the application of a single-line bucket of this type is to use it with a set of holding lines similar to those employed on a two-line bucket. This holding line is wound upon a drum operated by a motor possessing sufficient power to keep the slack out of the rope when moving in either direction. In this way, it is pointed out, the bucket can be discharged at any desired hight by a large foot-operated band brake on the holding drum. When the bucket is opened to its fullest extent, and therefore latched, the foot brake is released and the weight of the bucket is again placed on the closing line. The bucket can then be lowered without closing until it strikes the stock pile, and the design of the bucket was worked out in this way in order to concentrate the entire capacity of the hoist motor on the one drum, which is also used for hook service. When the bucket is not in use the holding line is disconnected from the bucket and wound on its drum, which then remains at rest. The holding drum motor performs about the same function as the spring in a shade roller, and possess a tendency to run ahead of the hoist motor when going up and lag behind it when going down. This arrangement, it is emphasized, eliminates all slack in the holding line and it is impossible to jerk the line when the bucket is discharged. In connection with the hook service a lifting magnet having a capacity of 2½ tons is used. The feed cables for this magnet are wound up and paid out by a small motor-operated winding drum which operates in exactly the same way as the holding drum mechanism.

In addition to the small motors used for the holding drum and the cable take-up the motor equipment of the crane comprises a 100-hp mill-type motor, which is employed for hoisting and a 35-hp. railway-type motor with a foot brake for travel. The controller for the hoist motor is of the magnetic switch operated type and is arranged for dynamic braking. The load is sustained by a disk motor brake of a new design which will permit the air-gap to be adjusted instantaneously and is of exceptionally large proportions.

The Great Lakes Dredge & Dock Company, Chicago, has been awarded the contract for removing the cofferdam around the United States ship canal lock in Black Rock Harbor, Buffalo, N. Y., at its bid of $79,908 for the steel piling, less the cost of removal, for which it asks $49,857.50, leaving the net amount which the government will receive for the steel piling $30,050.50.

The Stanley Committee's Accountant Makes His Report

Farquhar J. MacRae of New York, an accountant employed by the Stanley Committee to examine the books of the United States Steel Corporation, made his report to the committee on February 28. It covers several thousand type-written pages. The Steel Corporation refused to have its books taken to Washington, but consented to allow Mr. MacRae to have access to them. It is a remarkable document, as it not only deals with figures, but wanders far from the text to discuss matters that would seem to have no connection with an accountant's work. It declares that the Gary dinners limit production and control prices in the steel industry and that the United States Steel Corporation operates in restraint of trade. It further asserts that the corporation's power to restrain trade lies largely in its control of raw materials and through its system of interlocking directors.

How to Arrive at Net Earnings

Mr. MacRae states that the net earnings of the corporation for a period of nine years from April 1, 1901, until April 1, 1910, amounted to $1,029,685,389. The report of the Steel Corporation asserted that its net earnings amounted to $980,000,311. Mr. MacRae says the difference is due to the fact that in making his compilation of aggregate net earnings he included under that heading various items which had been eliminated by the Steel Corporation and charged up to other accounts in its records. Among these items restored to net earnings by Mr. MacRae were interest on bonds of subsidiary companies, the locked-up profits of inventories, special depreciation charged to construction, employees' bonus funds and special compensations and interest on bonds, mortgages and purchase money obligations of subsidiary companies.

It is asserted that the Steel Corporation, contrary to the statement made by E. H. Gary and H. C. Frick to President Roosevelt in 1907 at the time of the purchase of the Tennessee Coal & Iron Company that it did not control more than 60 per cent. of steel properties in the country, controls about 80 per cent. of the steel holdings. This remarkable showing is made by taking the total capital invested in iron and steel plants and computing the percentage of that total represented by the Steel Corporation.

Stress is laid in the financial section of the report upon the demonstration by figures that the Steel Corporation restrains competition by making the greater part of its profits in raw materials and in plants producing semi-finished materials, while the finished product plants make very low profits. This operates, it is declared, to keep the price of raw materials, ore, coke and pig iron on a high plane to the advantage of the corporation and disadvantage of the independent.

The Tennessee Acquisition

After an analysis of the taking over of the Tennessee Coal & Iron Company in 1907, the report says:

> It may not be possible to state the true intention in acquiring the Tennessee Company in a way which would be admitted by the men in control of the Steel Corporation, inasmuch as it appears to many experienced men who are also disinterested that the intention impelling its acquisition was merely the desire to bring under the control of the Steel Corporation the great possibilities for competition possessed by the Tennessee Company. The consequence of the acquisition should and must be held to have been intended in legal contemplation, even if the result so deduced conflicts with the intention declared to be in the minds of those responsible.

Of the policy of the corporation in enhancing the prices of raw and finished material, the report says: "The Steel Corporation officers openly declared the policy of buying all the available supply in order to keep up the price." Many quotations from the minutes of meetings are given in support of this.

The control of ore by the Steel Corporation—76 per cent. of competitive ore in Minnesota, 500,000,000 tons in the South, "in all 2,500,000,000 tons out of 4,462,940,000 tons of commercially available ore in the United States—is an ownership and a control which must interfere with competition."

The resolution that subsidiary companies of the Steel Corporation shall refuse to handle orders for export business, and that such orders must be turned over to the United States Steel Products (export) Company, through which the subsidiary companies preclude themselves from competing for export sales, is cited to show that "buyers in the United States who wish to buy goods for export are compelled to pay an additional profit to the United States Steel Products Company."

An Obliging Specialist

Under the above caption, the following incisive article is published by the Wall Street Journal, which is a paper that, despite its name, is absolutely independent and impartial in dealing with Wall Street matters:

Doubtless an investigating committee duly appointed by the House of Representatives has a broad discretion in the way it chooses to get its facts. It may employ experts, call such witnesses as it sees fit, and require the production of those documents that seem best to suit its purpose. Would it not be better, however, if it were definitely understood from the start that the committee made not the faintest pretense at an impartial investigation, and was in fact merely manufacturing evidence to sustain a conclusion reached before the hearings were opened?

It is impossible to avoid this conclusion in the case of the Stanley Committee to investigate the United States Steel Corporation. Its expert was required to show that the corporation was a monopoly, and he accordingly does so, with an array of figures which has at least the charm of novelty in spite of all that has been published on the subject, because they are evolved, for the most part, from Mr. MacRae's inner consciousness. They do not represent any existing conditions in the steel trade; and they make statements which flatly contradict the findings of other experts anything but biased in favor of the Steel Corporation.

Of the value of the results obtained by this so-called specialist three simple instances may be taken. He finds that the net earnings for nine years had been understated, and estimates them at $1,109,146,093. The figure, of course, looks tremendous, and to the lay mind represents an almost unthinkable sum. His estimate, however, is after all only one-half of one per cent. per annum in excess of that of the Steel Corporation itself. In other words, the difference is trifling, and as to what items should be charged to capital account any competent business man will prefer to accept the well tried judgment of the Steel Corporation management.

This is rather puerile than misleading, but Mr. MacRae's assertion that the corporation controls 80 per cent. of the steel business of the country is frankly, flatly and demonstrably untrue. Commissioner Herbert Knox Smith, whose report was distinctly hostile to the corporation, did not attempt to show 50 per cent. His figures, at least, were arrived at honestly, however prejudiced his conclusions might be, and he did not profess to show a majority of the productive capacity of the country.

This obliging expert is not content with the large control of ore lands as stated in Commissioner Herbert Knox Smith's report (its principal and most damaging point), but without weight or authority, without rhyme or reason, doubles those figures and, of course, finds without difficulty the portentous monopoly he was paid to find.

The report, moreover, is not, at it professes to be, a mere statement of facts. No court has ever held that the corporation is a monopoly in restraint of trade, and the matter is still pending. But this expert has the impertinence to make exactly that sweeping judicial finding on figures largely of his own invention. What other country in the world would tolerate such an act by a servant paid with public money? We accept it meekly; and, indeed, a people who tolerated the superfluous and mischievous Stanley Committee itself would tolerate anything.

The Midvale Steel Company, Philadelphia, Pa., according to financial journals, reports for the year ended October 31, 1911, net profits of $834,580. This compares with $1,311,181 for 1910 and $555,347 for 1909. Dividends paid and amount written off for depreciation took $787,500, leaving a surplus for the year of $47,080.

The Newark Foundrymen's Association

At a special meeting of the Newark Foundrymen's Association of Newark, N. J., held on the evening of March 1, a protest was made against the enactment into law of a measure known as Senate bill No. 325, which has been introduced in the New Jersey Legislature and is now in committee. The bill is intended to prevent the employment of women in foundries as core makers and molders. While most of the members of the Newark association would not be directly affected by the contemplated law, its terms are so far reaching that energetic opposition was determined upon and it was voted that a delegation should appear in protest at a hearing before a committee of the State Senate in the State House at Trenton on the afternoon of March 4.

George DeLaval, of Henry R. Worthington, Harrison, N. J., addressed the foundrymen and said that a number of the women employees of his company would go before the Senate committee and defend the work they were doing. Mr. DeLaval contended that the bill was so broad in its language that it would not only prohibit women working in foundries but in stamp works, electrical works and other industries. He conceded the right of the Legislature to make laws insuring proper sanitary and moral surrounding for women and girls, but disputed its right to say that they should not work at certain employments. He said investigation has proved that the women working in the Worthington works are employed under better conditions than in many garment shops and places where thousands of women are employed, both in and out of the State of New Jersey. The women core makers and molders are provided with proper accommodations of various kinds, including a suitable place to eat their luncheon, and the women who operate in the manufacture of meters are protected in every way against accident. He suggested that if women were debarred from the foundry, why not from the truck gardens and potteries in New Jersey which are largely worked by women? Speaking of the ability of the women, he said that as compared with men and boys they did better work and more of it and told of a contest between four women and four men molders where at every stage of a molding operation the women proved superior to the men.

A representative of the McNab & Harlin Mfg. Company, Paterson, N. J., said that a delegation of the women employees of his company also would testify at the hearing and that Board of Health inspectors had scrutinized his plant and failed to find anything to criticize.

A letter was read from Dr. Richard Moldenke, Watchung, N. J., acknowledging his election to honorary membership in the association and thanking the members. He said he would be glad to contribute to the discussions of the members whenever he could.

After the consideration of business the association listened to an address on the subject of "Foundry Lighting," by B. G. Worth, Jr., a consulting engineer of the staff of Walter Kidder, engineer, 140 Cedar street, New York.

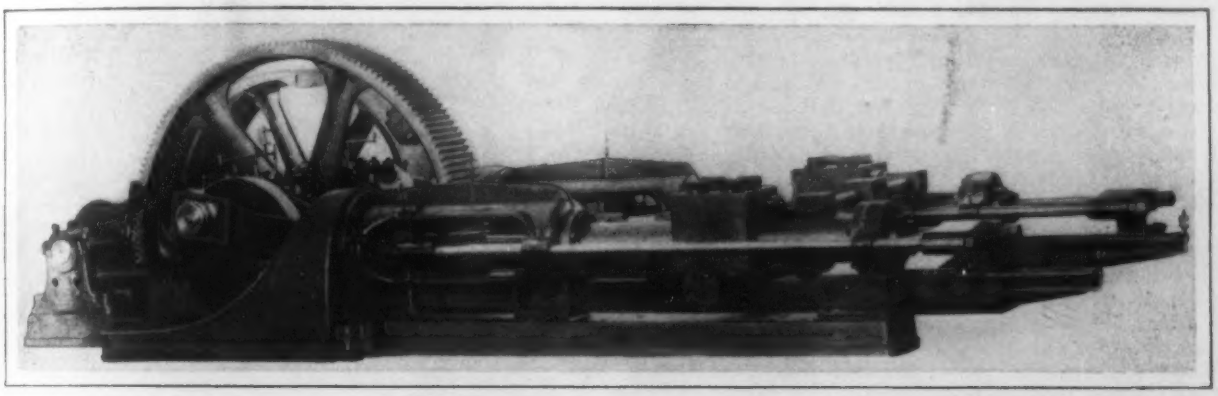
The blast furnace of the Belfont Iron Works, Inc., at Ironton, Ohio, will blow in this week. It has been idle for some time for relining and repairs.

A 5000-Lb. Pressure Pump

Two pumps recently built by the Deane Steam Pump Company, Holyoke, Mass., for the Chase Rolling Mills, Waterbury, Conn., are of more than ordinary interest on account of the working pressure against which they operate. Extremely high pressures in hydraulic pumping service complicate the problems of the power pump manufacturer, and these pumps, which are of the horizontal duplex, outside end packed, plunger type, are capable of delivering 50 gal. per minute continuously against a working pressure of 5000 lb. per square inch at 47 r.p.m. of the crankshaft. Two other special features of the pump are the elimination of pressure joints and the fact that the two of them were delivered within five weeks from the time that the order was received.

To eliminate the pressure joints each cylinder is made up integral with its valve chamber from a steel billet. The two chambers for the reception of the plungers, and all internal water passages subject to discharge pressure are drilled from the solid. The valve service is of tool steel, and each valve is separately accessible from above through an individual hand hole opening, an arrangement which greatly facilitates the refacing of the valves and their seats.

The four plungers being of small diameter, 2⅛ in., and the stroke comparatively long, 18 in., with a high net plunger load, made it necessary to use special care to prevent plunger deflection. The weight of the plungers, crossheads and side rods is supported at both ends of the cylinder on adjustable shoes and in addition the alignment of the side rods is maintained by guides on the yoke and on the outer end of the cylinders.



One of Two Recently Completed Pumps, Capable of Delivering 50 Gal. per Minute Against a Pressure of 5000 Lb., Built by the Deane Steam Pump Company, Holyoke, Mass.

The power end is of the builder's heavy service mill type. The gearing is machine cut from the solid blank, and the crankshaft, which operates in main bearings of the quarter box type, is an open-hearth steel forging. The disks, which are made integral with the pins, are furnace annealed steel castings. The connecting rods, which are of machine steel, are of the solid end type, are fitted with phosphor bronze bearing boxes and are adjustable for wear at both ends. The crossheads are fitted with adjustable shoes and operate in bored guides in the yokes. Deep retaining flanges and pans, which are made an integral part of the machine, prevent dripping of the lubricating oil and stuffing box leakage upon the foundation. The permanent alignment of the complete unit is insured by a deep heavily ribbed grey iron base extending from the base frame entirely under the yoke and the water cylinder.

The Care of Chains.—A valuable treatise on this subject, issued by the Jones & Laughlin Steel Company, Pittsburgh, is just off the press and is being distributed free among chain users. It is beautifully printed, in two colors, and supplies the information chain users need to show them how to get long life out of their chains. The most frequent cause for discarding chain, according to this booklet, is breakage, and that is usually due to crystallization. The booklet tells how crystallization can be overcome by a very simple home-treatment process which will restore the chains to their original condition and make them useful for many months longer, thus effecting great economy.

Cutting Speed Indicator

A New Device for Use with the Adjustable-Speed Motor Drive for Machine Tools

For use in connection with its adjustable-speed motors to secure the desired speed of the cutting tools, the Reliance Electric & Engineering Company, Cleveland, Ohio, has developed a device known as the Reliance speed dial. The use of this indicator is said to enable the machine tool operator to adjust the driving mechanism easily and accurately so as to give the proper speeds of the cutting tool under changing conditions of work. This speed dial can be mounted at any convenient point on the machine tool where it has some positive connection with the means employed for shifting the armature of the motor. Fig. 1 is a view of the dial, while Fig. 2 shows one of the drills of the Foote-Burt Company, Cleveland, Ohio, equipped with the device.

This dial has been brought out as a consequence of the increased use of the individual adjustable-speed motor drive. Where the speed changes are secured by the employment of either cone pulleys or gears the spindle has a certain definite number of revolutions per minute, which is usually indicated on the name plate of the machine, and it is a comparatively simple matter to embody specific instructions showing the step of the cone pulley or the gear combination at which each operation can be performed to give the maximum efficiency in the blue print for the work. With the adjustable-speed motor drive the speed combinations are many more in number and are not as easily calculated. In the case of the maker's adjustable-speed motor an infinite number of speed changes is obtained by shifting the armature. In this range there are no steps or jumps but a smooth, gradual and continuous change. It is pointed out that on a machine tool driven by this type of motor it is not necessary to make the approximations in speed setting, and it is always possible to obtain the exact cutting speed if the operator has some means of adjusting the speed of the motor to that required. As the motor armature is shifted and the gradual change in speed obtained, a pointer moves on the speed dial, the scales of which take into account the different gear ratios between motor and the work and can be set for different cutting speeds of the tool, depending upon the cutting steel employed and the character of the work. It will thus be seen that the device is not a means of indicating the speed of the motor but is an automatic calcu-

Fig. 1—A New Type of Speed Dial for Indicating the Cutting Speed and the Length of Stroke Made by the Reliance Electric & Engineering Company, Cleveland, Ohio.

lator, by which the operator can instantly set the speed of the motor to give any desired speed at the cutting tool, taking into account all the variable factors which would affect the problem. All the operator has to do is to set the dial for the cutting speed to be used and then shift the armature of the motor in the regular way until the pointer indicates the diameter of the cut to be taken on the proper scale for the gear combination used. In addition to acting as a guide for securing the correct speed

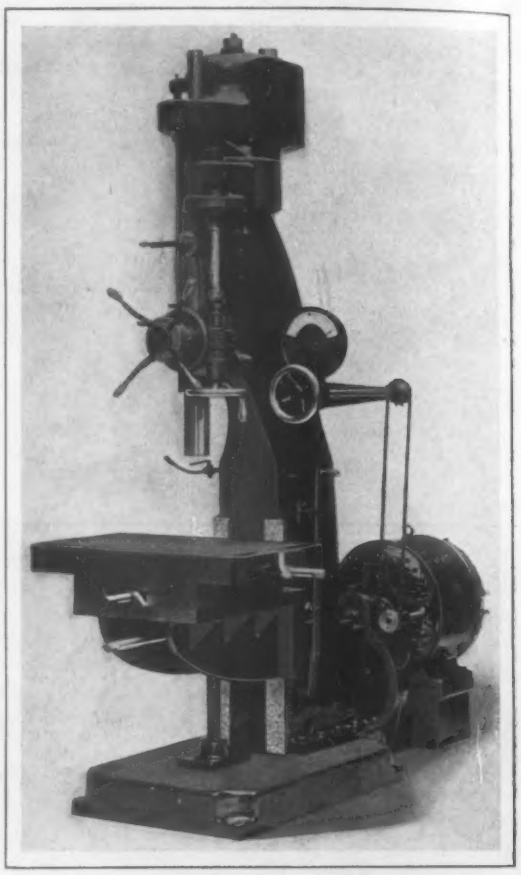


Fig. 2—The Dial Applied to a Motor-Driven Drill

the dial also serves as a definite indication to the foreman or inspector of the speeds in use by the operator since it is in plain sight.

The manner of using the dial is very simple. Fig. 1 shows it arranged for a crank shaper having one back gear. As illustrated, the dial is set to take a cut of 40 ft. per minute with the motor speed adjusted for a 20-in. stroke with the back gears in mesh. The upper scale, indicating the cutting speed, is stationary, while the small indicator, standing at 40, is mounted on a revolving disk with two lower scales. These which show the length of the stroke are adjusted by a knurl on the front of the dial until the indicator points to the desired cutting speed, and these scales are not shifted unless a new cutting speed is to be used. After the scales have been set for the desired cutting speed the motor armature is shifted by turning the hand wheel shown in Fig. 2 until the pointer of the dial that is geared to the handwheel rod is opposite the stroke to be used, which in the case illustrated in Fig. 1 is 20. The bottom scale shows the length of stroke with the back gears thrown out.

These dials can be furnished properly calibrated for use with the Reliance adjustable-speed motor on shapers, drills, lathes, milling machines, boring mills or any type of adjustable speed tool.

The industrial lighting problem is now one of the details of industrial plant operation which is being given special attention, and a bulletin issued recently by the Wheeler Reflector Company, 156 Pearl street, Boston, Mass., is welcome on that account. It is bulletin I-T and illustrates different forms of reflectors for general and localized lighting, giving diagrams of light distribution in each case. The reflectors are made specially for use with Mazda lamps and are made under the name Para-Steel. They have porcelain enameled surfaces with the reflecting surface usually white and the outside green or blue, although some of the reflectors are of paint enameled steel with a matte aluminum reflecting surface.

Board Drop Hammer

Details of a Recent Development of the Chambersburg Engineering Company

To meet the demand for an efficient and economical board drop hammer for producing quickly and easily drop forgings of different kinds, the Chambersburg Engineering Company, Chambersburg, Pa., has developed a line of board drop hammers which are made with falling weights ranging from 400 to 3000 lb. The special features of the hammer are the manner of adjusting the hammer for lining up the dies, the way in which the front rod is lifted up into place and a special type of knock-off construction. A three-quarter front and side view of one of the hammers is given in Fig. 1, while Fig. 2 shows the rear.

The construction employed in this hammer enables any thickness of dies to be used, and it is emphasized that the full benefit of the blow on any hight of die is secured and either a light or a heavy blow or a series of either can be struck at will by the operation of the treadle, thus allowing the operator full use of both hands for his work. The hammers are automatic in their action and are under the control of the operator. The stroke is adjusted by a rack and segment lever, and any adjustment, which, while so sensitive that a variation of any fraction of an inch or a foot can be obtained, can be quickly and easily made. It is emphasized that with this construction it is not necessary to dismantle the entire hammer to replace an adjusting bolt if it should break, and at the same time a rigid and lasting means of adjustment are provided. On account of the eccentric construction employed the front rod is perfectly straight and is lifted up into place on the shaft without any shock or jar as the releasing lever is rolled along in the rack and gives a direct and gradual pick up to the rod. In this way the breakage of the front rod, due to crystallization, is said to be eliminated. Adjustment for the various hights of dies is made by the knock-off clamped to the front rod. The incline for the knock-off is also so laid out that the force of the impact is not transmitted to the front rod. In this way it is pointed out that the hammer has been made practically noiseless, the only sound being that of the two dies striking each other, an arrangement which enables higher speeds to be employed with a resulting increase in the output of the hammer.

Details of the Hammer

The head or lifter is mounted on the top of the frame and securely held in place by four screw bolts in drilled holes which have spiral springs to absorb the shock. Either plain or geared rolls can be furnished, as may be desired, and these, together with their driving spindles, are located in the hooded eccentrics, the front one being for operating and the rear one for adjustment only. These parts are steel castings made in one piece which, it is emphasized, assures exact alignment. The rolls are so constructed that they cannot get oil on them where they bear against the boards. The spindle bearings, which are very large, are bushed with bronze and are amply provided with oil reservoirs. The board clamps are located at the extreme top on duplicate eccentrics in bored holes, which keep them out of the way of any oil. They are said to be positive in action, and a permanent alignment of both the rolls and the board clamps is said to be always assured regardless of how careless the operator may be.

When the ram is suspended the board is so gripped that it hangs free of both rolls. It is emphasized that with these clamps the heaviest rams are instantly gripped in any position, although the board may be badly worn, and when the treadle is fully depressed the board falls freely, no matter how much it may be worn at the point of pick-up. In this way the trouble experienced from the unused part dragging through the clamps just before the blow is sttruck is done away with. Adjustments to the back roll and board clamps to take up the wear of the board are made from the floor by the adjusting bars led down the back of the machine, as shown in Fig. 2, to within easy reach of the operator. This adjustment will take care of 7/16-in. wear of the board.

The frames are made of cast iron and are of the reinforced I-beam section. They are deeply pocketed in the anvil, having a bearing on their outside edges for the entire length of the tongue and also bear on the entire bottom surface, thus assuring perfect and permanent alignment of the frames and the ram. The tops of the frames are machined to jigs and are tongued and fitted to the lifter head. Steel bolts with distance pieces keep the frames at the proper distance and also hold them in line with the lifting rolls. The greatest weight in the frames is at the base where the blow of the ram is to be taken when the dies meet. The frames are about 2 ft. shorter than the general standard, although the fall of the hammer is greater than the average. This, it is pointed out, insures great rigidity and removes the top hamper and strain of the long frame type of hammer. The bearing surface of the V's has been made large to provide ample strength and wearing surface.

The adjustment of the frames to align the top and bottom dies is made by very large tension bolts, and the construction is such that in case of fracture they can be passed out into the die space and quickly replaced without disturbing the construction in any way. These bolts are supported for their entire length in a bored hole, and have a lock washer which will automatically and positively hold the adjusting nut in any position in which it

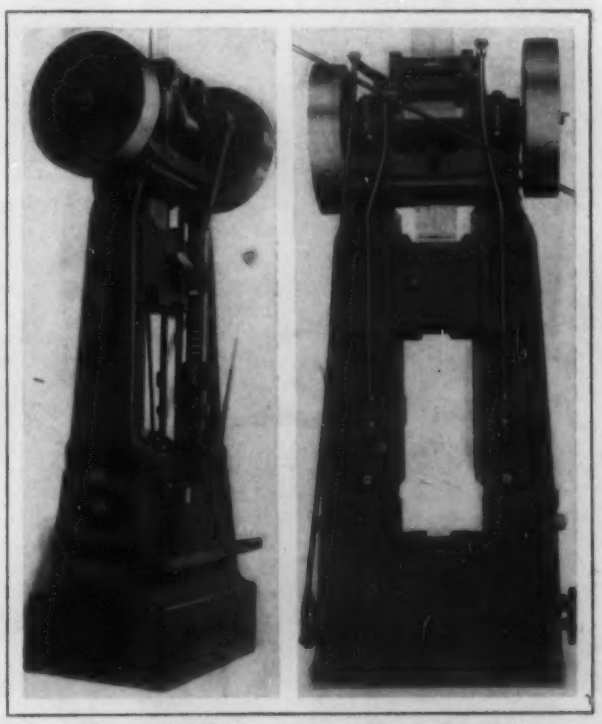


Fig. 1—Front and Side View Fig. 2—Rear View

Two Views of a New Board Drop Hammer Built by the Chambersburg Engineering Company, Chambersburg, Pa.

may be placed. The minimum adjustment of the frames is 0.0026 in.

The ram or hammer is made of open-hearth 0.40 per cent. carbon steel. It is balanced and made deep enough from the front to the back to insure the alignment of the dies, and is the proper length in proportion to the distance between the dies. The lifting boards are of well seasoned maple fastened to the ram and secured by an undercut plate with teeth on one side. In this way it is possible to use a straight board and prevent it from pulling out, and if desired the board can be put in while the pulleys are running.

The anvil is of cast iron of the same composition as the frame, and is made in one piece. The anvil cap is made of 0.40 per cent. open-hearth carbon steel, and any desired shape of die notch will be planed in the ram and cap. The hammers can be furnished with anvils weighing either 15 or 20 times the rated falling weight of the ram, and if so desired can be made of steel. The anvil is secured to the frame by four screw bolts, having spiral springs to reduce the shock. These bolts are set at an angle and the pockets for the heads are removed to the compression side of the anvil, thus doing away with possible breakage at the bolt pockets.

Either Rockwood compressed paper pulleys or pressed steel pulleys will be furnished at the option of the purchaser.

New Ring Wheel Grinder

A new grinder designated as its No. 16 24-in. L ring wheel grinder, and which is heavier and more powerful than any machine of this type heretofore built by this firm, has been recently placed on the market by Charles H. Besly & Co., 118 North Clinton street, Chicago, Ill. This grinder is intended for larger and rougher work than is ordinarily done on disk grinders, and is equipped with the builder's Helmet pressed steel ring wheel chuck, which was illustrated in *The Iron Age*, July 20, 1911. A view of the machine equipped with two geared lever-feed work tables and two Helmet pressed ring wheel chucks holding rings or cylinder grinding wheels 24 in. in diameter is given in Fig. 1, while Fig. 2 shows details of the hand-lever feed with which the grinder is equipped.

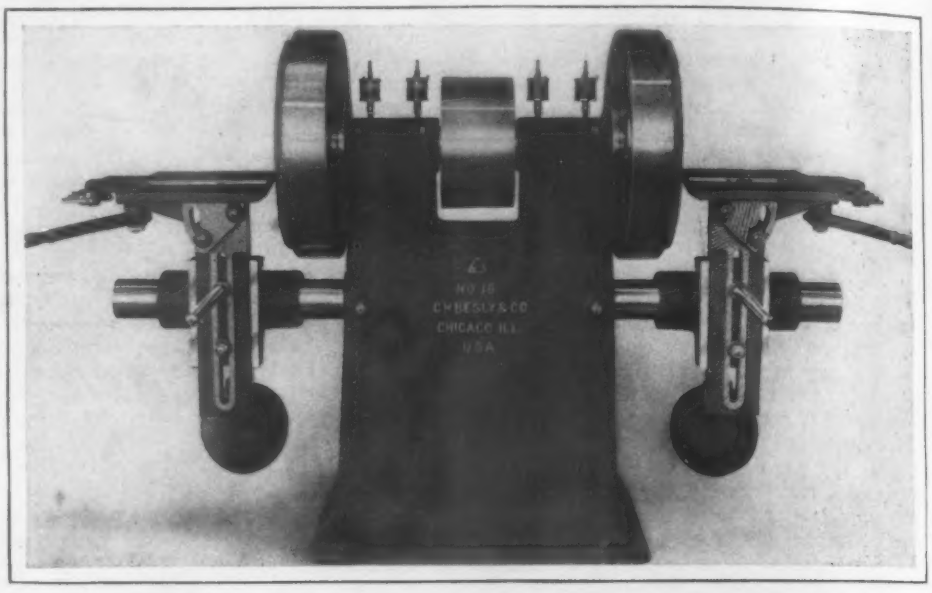


Fig. 1.—The New No. 16 Ring Wheel Grinder Built by Charles H. Besly & Co., Chicago, Ill.

The construction of the grinder is very massive and rigid, the machine itself weighing 3500 lb. The geared lever-feed table, which weighs over 600 lbs., gives a leverage of 18 to 1, and the machine will remove approximately 1/16 in. of stock from the bottom of a sad iron casting in about 10 sec. with a feeling of pressure on the surface being ground of approximately 100 lb. per square inch. Each chuck weighs 275 lbs., and with a new grinding ring in place the weight is 415 lb. The dimensions of these rings are external diameter, 24 in.; diameter of opening, 11 in., and depth of hole, 5 in. It is emphasized that these vitrified grinding rings will stand more severe service than the ordinary emery-cloth-covered disk wheels. The spindle driving pulley is 15 in. in diameter and will transmit over 30 hp. through an 8-in. belt. The spindle is 3¼ in. in diameter and each bearing is 12 in. long, and the end thrust is taken on hardened and ground collars having an area of over 20 sq. in. The rockershaft, which is 4½ in. in diameter, is 7 ft. long.

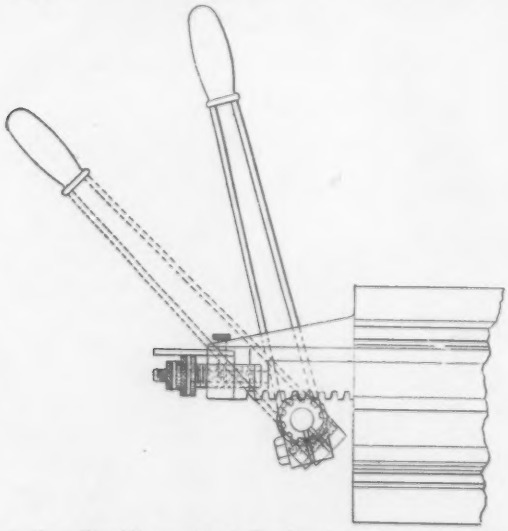
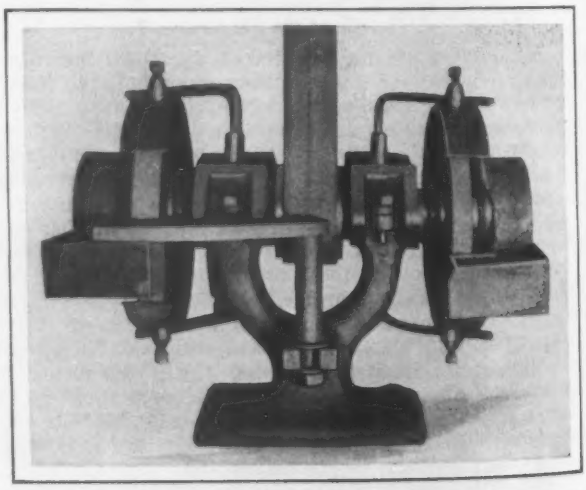


Fig. 2—The Hand-Lever Feed Employed in Connection with the Grinder

The ratio of leverage of a machine of this type with hand lever-feed is an important feature, which enables the workman to put sufficient pressure on the work to secure the maximum efficiency of the grinder without undue exertion. The large ratio of leverage in this machine, 18 to 1, is obtained through a rack and pinion, as shown in Fig. 2, with a lever only 20 in. long. This geared motion gives the necessary table travel with the maximum ratio of leverage for the length of lever used. It will be noticed from the engraving that the lever is clamped to the pinion stud and its position may be changed as indicated by the dotted lines to bring it into the most convenient position to adapt it to the varying hights of the different workmen who operate the machine.

Universal Emery Wheel Guard

For meeting the requirements of the average shop tool grinder and covering emery wheels having a maximum diameter of 8 in. and a face width of 1½ in., the Universal Stamping Company, 47 Poultney street, Buffalo, N. Y., has brought out an emery wheel guard. This guard covers the outer end of the spindle and nut completely, as will be noticed from the engraving, while the outer end and the face of the wheel are covered with the exception of the grinding space, which is sufficient for the average tool. The inner end of the wheel is left open to permit the entire side of the wheel to be used if desired.



A New Type of Guard for Emery Wheels Made by the Universal Stamping Company, Buffalo, N. Y.

The guard is supported by a steel rod which is clamped over the outside of the bearing box. This clamp is made in two pieces, the parts being held together by two cap screws and clamped over the bearing box with two set screws locked with jam nuts. By loosening the rear cap screw on the clamp and the two set screws which are shown above and below the guard the rod can be raised or lowered and swung to either side, thus permitting the guard to be adjusted as the wheel wears. The water pan which fits close to the guard just below the grinder, it is pointed out, in addition to being available for cooling purposes also assists in settling the dust. The pan is readily removable for cleaning or filling.

A Hygienic Riveting Furnace

BY DR. ALFRED GRADENWITZ

Many attempts have been made to minimize the smoke and the heat nuisance which have been invariably connected in closed rooms with riveting furnaces heated by coke or coal. The smoke hoods generally in use only fulfil their task in an imperfect manner and in spite of their large dimensions discharge only a part of the exhaust gases,

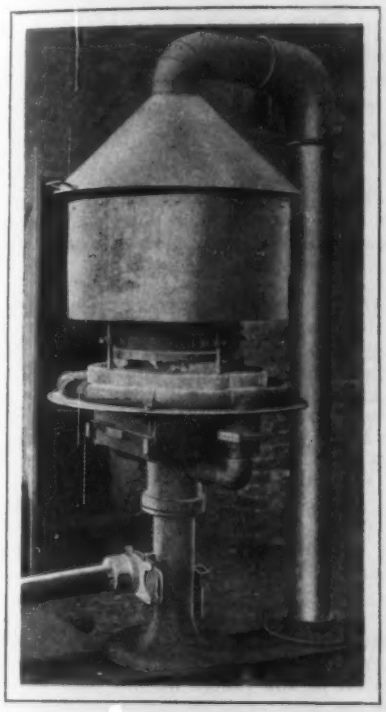


Fig. 1—Exterior View of a New Hygienic Riveting Furnace Built by Brüder Boye, Berlin, Germany

while they cannot eliminate the heat radiation which is an inconvenience to the men. The rotary riveting furnace designed by Brüder Boye, Berlin, Germany, insures both a positive removal of the gases of combustion and eliminates the radiation of heat, thus affording an effective protection against the bad air as well as the heat. Fig. 1 is an ex-

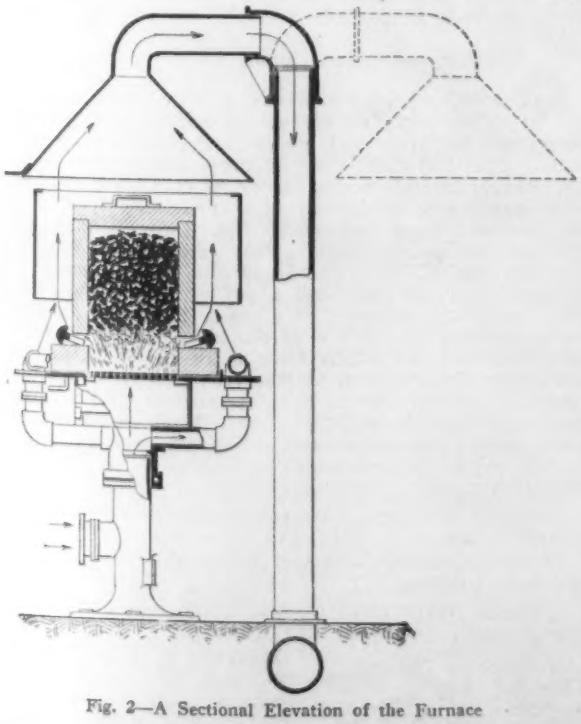


Fig. 2—A Sectional Elevation of the Furnace

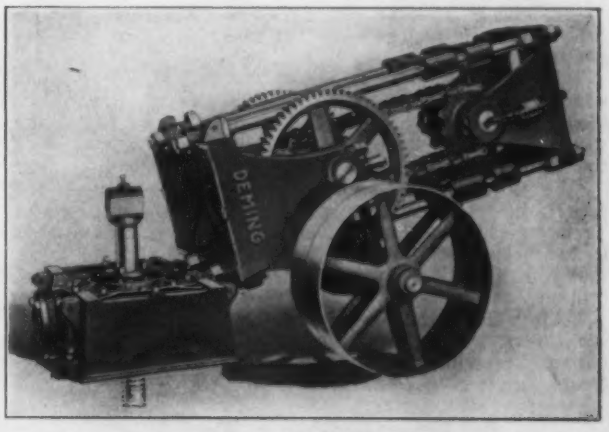
terior view of the furnace while Fig. 2 is a sectional elevation showing the arrangement of the different parts.

The furnace comprises a pit approximately 14 in. internal diameter with slots which is free to turn around a stationary foot. The pit is closed by a removable cover and the hight of the slot is either fixed or adjustable, thus adapting the furnace to the diameter of the rivets to be heated. The discharge openings of the furnace are surrounded by an air chamber comprising a space through which a current of cold air is driven at an angle against the gases escaping from the fire. These are thus deflected toward the top of the furnace, passing at first behind a protective plate which surrounds the pit of the furnace like a ring. From here the gases pass into the protective hood, which is free to rotate around the vertical pipe, two positions of this hood being shown in Fig. 2. The gases are sucked down through this pipe, which is about 8 in. in diameter, into the main outlet, which is connected with an exhauster of the requisite size.

Where there are no underground smoke exhausters, an exhaust toward the top is provided, the rotary hood, which has a diameter of about 35 in., being replaced by a counterweighted vertical adjustable hood. The joint action of suction and pressure prevents the gases from escaping into the room while the air curtain formed in front of the entrance slot eliminates the heat radiation. This arrangement enables the furnace to be located in the immediate vicinity of the operators, which results in a more advantageous utilization of the available space and results in a saving of energy and fuel.

Deep Well Power Head

A new power working head for deep well pumping, which represents a radical departure from the design of the usual power-driven working head, is being brought



A New Type of Power Head for Deep Well Pumping Developed by the Deming Company, Salem, Ohio

out by the Deming Company, Salem, Ohio. The special features of this head are the use of a chain drive, an unusually long stroke and a compact design.

The head is made with strokes 36 and 48 in. long, and if desired longer ones can be secured. This long stroke decreases the number of reversals, and it is emphasized that a corresponding reduction in the trouble with the sucker rods, resulting from frequent changes in the direction of the stroke, has been secured. As there is no long throw crank with the resulting side thrust to overcome, the weight of the head is lighter than would be possible with a crank design head having a much shorter stroke.

The power is applied through a single reduction gear to a double chain drive, the up and down strokes being at uniform speed throughout except for a short portion at the ends. The design is compact, the hight for a 48-in. stroke head being only 83 in. It is also possible to gain access to the cylinder and the sucker rod readily by disconnecting the differential plunger from the cross head, loosening two bolts and swinging the top back, as shown in the accompanying engraving.

The working head illustrated is designed for a cylinder having a maximum diameter of 7¾ in. and a 4-in. discharge pipe and a maximum plunger load of 3000 lb. The speed of the pulley shaft is governed by the plunger speed desired, and for a plunger travel at 120 ft. per minute the plunger shaft should operate at 193 r.p.m. The standard belt-driven pump is furnished with an air chamber and tight and loose pulleys 24 in. in diameter and 6 in. wide.

The Tariff Hearings at Washington

Further Protests Made Before the Senate Finance Committee by Manufacturers of Sheets, Plates, Tin Plates, Crucible Steel, Chain and Various Specialties

Continuing the very full presentation given in *The Iron Age* of February 29 of the testimony given by iron and steel manufacturers at Washington we present below reports of the statements made by representatives of other important lines. These bear on the failure of the makers of the Underwood metal schedule to make any careful study of relative conditions in the iron industry at home and abroad or to provide in any adequate way for the difference in European and American labor costs.

The Tin Plate Industry

Statement of W. U. Follansbee, of Follansbee Brothers Company, Pittsburgh

MR. FOLLANSBEE: I am representing not only Follansbee Brothers Company, with mills in the town of Follansbee, W. Va., but also fourteen or fifteen other independent tin plate manufacturers scattered quite widely over the country. On behalf of all of these independent manufacturers we wish to protest against the Underwood bill. It is hasty; it has been drawn up in ignorance of the facts, with an insufficient consideration of the subject, indifferent regard for American capital and labor, but primarily labor, and is particularly unjust and discriminating in the attempt to raise revenue at the direct expense of the tin plate industry.

SENATOR SIMMONS: You speak of representing the independent manufacturers. What constitutes those that are not independent?

MR. FOLLANSBEE: The United States Steel Corporation, which controls about 60 per cent of the business. When they started they practically controlled it all. We, the 40 per cent independents, have grown into existence since the United States Steel Corporation was formed.

We protest against an ad valorem basis for duties. We recognize that it has been condemned by the United States Treasury officials quite universally. We understand that it has been discredited by other nations; and we know that it is a method that is subject to a great deal of deception.

[After describing the method of manufacturing tin plate Mr. Follansbee took up the question of wages at home and abroad, referring to the brief of the tin plate manufacturers, as given in *The Iron Age* of February 15.]

Bad Labor Conditions in Welsh Mills

I was in Wales in 1888 and we were then talking tariff on tin plate in this country. They told me we could not make it. I was not over there to engage in the tin plate business on this side; I was over there as an importer. They said: "You cannot make tin plate in America. Your climate is going to knock you out. It is exceedingly hot and burdensome," and all that, which, of course, I laughed at. I want, however, to read extracts which were published in foreign papers. The McKinley bill passed in 1890 and went into effect in midsummer of 1891. This is from the London Iron and Steel Trade Journal of April 12, 1890:

> The greatest obstacle to tin plate making on a large scale in the States is the entire absence of cheap female labor, so necessary in the industry, and so abundant in Wales.

The same paper on December 5, 1891, says:

> In Wales the adult work people have been engaged in the tin plate trade from childhood, and their children as soon as capable assist in the mills. It is, indeed, not an uncommon occurrence to find whole families working together. The making of tin plate, as the children grow to men and women, becomes a habit and they acquire a great dexterity, saving much time and labor, and the wages of the female laborers and children are but a tithe of what American skilled workmen would demand.

Pardon just this illustration: After the coated sheets come from the tinning pots they are carried to what is known as the assorting room, where they are inspected. In Wales they are inspected by cheap girl labor. In this country they are inspected by skilled, high-priced labor. When I was in a very large mill in Wales I saw this: A box of tin weighing over 100 lb. would be picked up and it would be in the loose sheets where it would be very hard to carry. It would be picked up by a girl about 15 or 16 years of age and would be placed on her hip in this way (indicating), and she would carry it from the tinning pots down to the assorting room—a distance in some cases of 100 ft., sometimes 150 ft. to 200 ft. I would not like to see any American girls doing that kind of work. It was on a dirt floor, where the water had been dripping, and it was muddy. I said to quite a large Welsh manufacturer: "Man, why don't you get away from that kind of labor?" He said: "What can I do?" I said: "You can put a donkey in here and a little truck and pile up 25 or 30 or 50 boxes at once, instead of having these young girls carry them, who ought to be at school." He said: "Why, the donkey would eat more than we pay these girls." That is the kind of labor we have to compete with.

SENATOR CLARK: How is it now? Does that condition still prevail there?

MR. FOLLANSBEE: I think to a very large extent it does. One of our good men was over there this last summer, and when he came back I asked him how he found things in Wales. He said: "When I worked there I thought a lot of the things we did then were all right; but it made my heart sick to see those girls and women working, for instance, around the pickling machines." We have mighty few men that can stand it, I tell you, gentlemen. It is wet and dirty and sloppy, and the fumes are nauseating, and they have to work short hours with us. Our picklers in our tin mills as a rule quit at 4 o'clock in the afternoon. The sister of another of our men was over there a year or so ago; and she wrote to her brother: "Billy, it was nice to come back home after being away for thirty years; but there is a good deal of sadness in it, too. The same old ash pile is right there in front of our door." It is dirt and it is squalor. They do not know anything else. * * * * *

Manufacturers Concede Some Reduction in Duty

We are the youngest of the iron and steel industry. We are glad to say we are not an infant. This year we attain our majority, and arrive at the full stature of a man. The tin plate manufacturers always have been exceedingly candid on this matter of duty since the business was firmly established in this country. * * * * Personally, I have interviewed Mr. Underwood; I have interviewed Speaker Clark, I have interviewed Congressman A. Mitchell Palmer and told him we had nothing to conceal; that we suggested a 20 per cent reduction in the Payne bill, and we were going to suggest another reduction this time. We presented a brief, a copy of which is here and which I am going to file as part of the record, suggesting a further reduction from 1.20 that was in the Payne bill to a flat 1 cent per pound. They reduced it to 20 per cent ad valorem, which would amount, owing to the fluctuating market, to from something under ½ cent per pound to probably as high as 56-100 cent—less than 50 per cent of the Payne bill rate.

SENATOR HEYBURN: Are you suggesting a reduction to 1 cent?

MR. FOLLANSBEE: We are, Senator. That is what we are recommending.

SENATOR HEYBURN: Do you know that every other manufacturer could stand the reduction?

MR. FOLLANSBEE: I have suggested it after consulting with them all, and having them put it in my hands.

SENATOR HEYBURN: Suppose an entirely new combination of business men wanted to start in the tin business: Of course they would not be on as favorable a basis as you are with your start and your trade and your custom. Might not they need the existing duty?

MR. FOLLANSBEE: Heaven help the tin plate man that wants to start in the business at the present time.

SENATOR HEYBURN: That is the reason—because he is going to be pinched right down to less than the present duty, simply because somebody already started can stand it.

Booms and the Tariff

MR. FOLLANSBEE: I have been in the metal business long enough to have gone through the boom of 1879. The boom of 1899 is so recent that even the youngest of us can recollect it. We make money very rapidly in the booms. I was simply a metal jobber in the boom of 1899. I would not dare to tell this if I thought it was ever going to go to such extremes; but we made 150 per cent on our capital that year. We made little or nothing in the next year. Our concern had loaded up with everything we could possibly sell for over a year, in the year 1898, at the lowest prices that ever existed anywhere. Those prices went up by leaps and bounds in 1899, simply because the depression was over. We had started in in 1893 and the depression had lasted for five or six years, and everything had been going down. Everybody had refused to buy. The country was bare and stripped of everything. Capital had refused to invest in plants. So when 1899 came you could not get the goods and they went out of sight. In 1899 and succeeding that this country was not able to supply the requirements. The mills were practically a year behind in executing their orders. We simply could not get the goods. The country was suffering a hardship. They were paying the prices that naturally resulted because there were three buyers for every seller. Now, with all due consideration to protection to the American manufacturer, I believe that the exception proves the rule, and that the duty should be protective except when the American manufacturer cannot reasonably supply the demand; and then I think the goods should be imported.

SENATOR HEYBURN: Which American manufacturer—the one already established, or those who may go into the business because of the lack of manufacturing capacity? Are not the men who would go into the business entitled to as much protection as the men who are in it?

MR. FOLLANSBEE: Senator, that day is all over in the iron and steel business.

SENATOR HEYBURN: Never will I believe that the element of competition has passed forever out of the American market.

MR. FOLLANSBEE: Oh, it surely has not.

SENATOR HEYBURN: It is not the men who are in the business alone that are to be protected, but it is the men who want to go into the business, or who may want to go into it.

MR. FOLLANSBEE: They will be protected under what we are suggesting—1 cent a pound.

High Wages in American Mills

[Referring then to the brief of the tin plate manufacturers, Mr. Follansbee took up the statement of Congressman Palmer in presenting the bill in the House, particularly his references to the Bethlehem Steel Company. Mr. Follansbee pointed out that that company made no tin plate and its hours and wages did not apply, and then said:]

Congressman Palmer states that, according to the statistics of the State of Pennsylvania—he does not give the year, but I think it was about 1909—the average annual rate of the tin mills in the State of Pennsylvania was $700.72. That figures out $2.80 per man. I think those of us that are operating our plants in West Virginia are making a better showing. I cannot go into the details of my competitors' pay rolls; but I have no hesitation at all in stating that Follansbee Brothers Company in the year 1911 paid on an average to each one of the men in its tin plate department, including the laboring hands, $3.25 per day, and their earnings averaged $874 per annum.

* * * *

Coast Trade Given to Foreign Mills

In the framing of this bill the present Ways and Means Committee have conceded the differences in the tin mills, between America and Wales, and have granted us that 45 cents a hundred pounds. They have conceded the difference in capital investment between Wales and America of 10 cents per hundred pounds, and have practically given us in this 20 per cent ad valorem rate, a protection of 55 cents a hundred pounds, as against the $1 per hundred pounds that we asked.

The crux of this difference, however, depends on the point of consumption of tin plate and that, of course, is what represents the consumer's cost. As we state in our brief, two-thirds of the consumption of tin plate is at the seaboard. There are two reasons for that. Tin plate having been all imported for many years, it was natural that the buyer in this country should wish to be located at the cheapest point; that, of course, was at the seaboard; and they are still there. The other, and more important reason at the present time, is that from 90 to 95 per cent of all the tin plate that is manufactured any place in the world, is used for containers, cans. And most of it is used for foods. Along our eastern seaboard, Baltimore, for instance, is the largest consumer of tin plate in the world. You go out to the Pacific Coast, and it is a very large and a very growing item in their salmon packing, all in cans; and in the State of California their fruit and vegetable packing, all in tins. The freight rate, of course, comes in, and it makes the question of tremendous importance. I would like to read what Congressman Palmer has to say on that:

> The effect of railroad rate reduction is to extend the overlapping markets of the various steel and iron centers just the distance that the lowered rate will permit the manufacturer to ship his material farther than he could do under the higher rate. A like result will obviously flow from the reduction of the customs duties upon these heavier forms of iron and steel production, where transportation charges so largely enter into the final cost. A lowered duty will widen the zone of competition between the foreigner and the American manufacturer to about the extent that the reduction in duty will pay the transportation charge inland from the port of entry.

Our consuming point of two-thirds of this industry is at the seaboard, at the point of entry. On page 1428 Congressman Hill asks: "If we meet the competition, and we would meet it, if we are able to do it without protection, where is your revenue if we do not have the increase?" And Congressman Palmer replies:

> There will be an increased importation because the American will not be so easily able to meet the competition in certain sections of the country. The American will have a market which will be a little more, only a little more, restricted than he has at present, the foreigner being able to pass the port of entry a little further than he has been able to do in the past.

Interior Market Only One-Third the Total

To show that the sub-committee which presented this bill and the House, which has so supinely accepted their recommendations, are proposing to deliver over to the foreign tin plate manufacturers the Pacific Coast trade and the Gulf trade, I beg leave to refer to the Congressional Record, where Congressman Palmer is thus quoted:

> Take, for instance, tin plate. Tin plate sells at a certain price in Pittsburgh. It costs the consumer in New Orleans or San Francisco very much more because, obviously, it costs money to carry it across the continent. Now, the foreign manufacturer can never in a thousand years, perhaps, with all the reduction we put on the article in this bill, bring his tin plate into Pittsburgh, but he can lay it down at New Orleans and at San Francisco at a price which the Pittsburgh manufacturer cannot meet, and the Pittsburgh manufacturer will not have to meet it, because the natural increase in the consumption and demand for this product will still leave him, as an American manufacturer, a market which will be sufficient to take the ordinary supply.

Gentlemen, I want again to emphasize the fact that this market is not in the interior, but it is at the coast, and Congressman Palmer proposes to take the coast trade from us, and there is not the market in Pittsburgh or in the interior except for about one-third of the entire American consumption. Congressman Palmer says:

> The independents have declared that they would be satisfied with a further reduction of the present duty to 1 cent per pound, or $1 per package of 100 lb. An examination of cost of production and transportation charges, however, clearly shows that such a rate would be just as prohibitive now as 2.2 cents was under the McKinley law. The duty fixed by the pending bill of 20 per cent is equivalent to 64 cents per hundred pounds, and this will result in an estimated revenue of $1,000,000.

A Loss of $5,000,000 to Wage Earners

Permit me to repeat that, gentlemen: "This will result in an estimated revenue of $1,000,000," or take from the American manufacturer, for the Pacific and the Gulf coast trade, $1,000,000, to come definitely and specifically out of the lowering of the duty on the tin plate item. He is wrong in his figures—64 cents per hundred pounds, which at 20 per cent would be $3.20, as the cost per hundred pounds of the Welsh plate f.o.b. Welsh ports. That is entirely too high. But, conceding that for the basis of figuring, his 64 cents per 100 lb. would equal $12.80 per net ton and to accord the estimated revenue of $1,000,000 would necessitate the importation of 78,125 net tons, or approximately 10 per cent of the American production in the year 1911. * * * * That 78,125 tons, which they deliberately suggest and propose to turn over to the

foreign manufacturer, is equivalent to the production of 26 American tin mill units, at 70 men per mill, or the equivalent of 1,820 men thrown absolutely out of employment that their labor may be given to the Welsh workmen. At Congressman Palmer's own estimate of $700 per annum earned by the Pennsylvania tin plate worker the wages that would be lost to these 1,820 workmen in the United States would be $1,274,000. Our brief shows that in the other wages, in smelting the pig iron, reducing the pig iron to steel, etc., a proportion of about 60 per cent on the raw material of tin plate, which must be added to the lost wages directly in the tin plate mill, the $1,274,000 which was mentioned would amount to $764,000; or $2,038,000 lost specifically to American wage-earners by this proportion of the American product which it is proposed to turn over to the foreigner.

That would be bad enough, gentlemen. But this coast trade on the Pacific coast amounts to 125,000 tons, approximately. The Gulf trade, including Savannah, where the freight rates are against the American manufacturers, the same as to New Orleans, would amount, in round figures, to 25,000 tons. Adding them together, you have practically 150,000, and I am inclined to think it would run fully 160,000 tons, which would be fully 20 per cent of the American tin plate trade. The lost wages to workmen are thus brought up to $3,976,800. And you are not then including the miner, who is digging the coal to make the steam to run the mills. I do not know how many men that would add, but it would run up into hundreds—as much as a thousand or more—and their wages thrown in with the others would certainly make $5,000,000 per annum lost to the American wage-earner.

SENATOR HEYBURN: And several times that to the people who furnish these wage-earners with the things they consume?

MR. FOLLANSBEE: Absolutely.

[Here follows a criticism of Congressman Palmer's figures showing that the Welsh manufacturer has an advantage over the American manufacturer of 62 cents a box, while the duty proposed (20 per cent on an estimated value of $3.20 a box abroad) would be 64 cents. It was shown that the valuation of $3.20 taken from the Treasury Department statistics was on the high-priced tin plate of which only a small amount comes in and does not represent the ordinary Welsh tin plate.]

Lower Cost of Domestic Steel Makes the Difference

SENATOR JOHNSON: I understand you that from the very exhaustive and detailed report you have made here, and the study you have given the subject, you could now maintain the wages which you pay and reduce the tariff from 1.2 cents per pound to 1 cent per pound?

MR. FOLLANSBEE: You are correct.

SENATOR JOHNSON: And did you not say to the Payne Committee that to cut the duty from 1.5 cents to 1 cent would result in cutting of wages and all these appalling things you have now detailed to us?

MR. FOLLANSBEE: I did, yes.

SENATOR JOHNSON: Now you say business is in a deplorable condition?

MR. FOLLANSBEE: Yes, the general steel business.

SENATOR JOHNSON: But I understood you that applied to your business also.

MR. FOLLANSBEE: Not so much as regards the demand and the consumption. The tin plate mills are running quite full. They are running full, however, at very low prices, cost or under cost; and the tin plate worker is still getting a maximum wage.

SENATOR SMOOT: Have you learned since 1909 to produce tin plate any more cheaply than you did at that time?

MR. FOLLANSBEE: Yes, because our raw material, the steel bar, has gone down about $6 per ton.

SENATOR SMOOT: And that would be one of the reasons why you said you could get along with 1 cent today instead of 1.2?

MR. FOLLANSBEE: That is the whole reason; and the reason we cannot go below the 1 cent is the fear that our raw material may go up coincident with the Welsh going down. They are inordinately high at the present time and we are inordinately low.

SENATOR SMOOT: And in 1909 that was not the case?

MR. FOLLANSBEE: Just the opposite. We were $6 a ton higher than they.

SENATOR SMOOT: If Mr. Clark had asked you this year if you could have got along with 1 cent, you would have told him you could have under the conditions?

MR. FOLLANSBEE: Absolutely.

SENATOR JOHNSON: But the trade conditions were better in 1909 than they are now, as I understand you?

MR. FOLLANSBEE: This cost of raw material accounts for it absolutely.

SENATOR JOHNSON: I am asking you about the general demand in this country and the trade conditions here in your industry.

MR. FOLLANSBEE: The increase in the tin plate business has been so comparatively regular that we have not suffered in tonnage. But I want to make very plain the resultant competition from the dullness of the other lines and the steel going into the tin plate.

SENATOR JOHNSON: What about your prices in 1909 as compared with those now?

MR. FOLLANSBEE: They were very much higher.

SENATOR JOHNSON: Then you could have stood a reduction at that time?

MR. FOLLANSBEE: No, because our costs were also very much higher.

SENATOR JOHNSON: Yes; but in proportion to the price?

MR. FOLLANSBEE: Yes, almost entirely so. Six dollars a ton, you know, is a very big change in steel.

SENATOR HEYBURN: You would not favor a policy of keeping a metal down forever because it had gone down on account of circumstances peculiar to the time or the conditions; you would not take the tariff off so it never could rise again?

MR. FOLLANSBEE: I would be ashamed to look any of my brother manufacturers or any of my stockholders in the face when I got home if I did make any such statement.

SENATOR HEYBURN: Is not that the line of reasoning that is suggested because your raw material had gone down $6 a ton we must put a peg on it and keep it there? It looks that way to me. We want to give a chance for it to rise again.

The Steel Plate Industry

Protest of W. P. Worth, Worth Brothers Company, Coatesville, Pa.

MR. WORTH: We manufacture pig iron, plates and boiler tubes. I am here to protest against any change in the present tariff. I feel that we have worked under the present tariff but a short time. Our duties were reduced under that, and it certainly would be a great hardship to have any such reduction of duties as is proposed in the new bill. The proposed tariff is 15 per cent., which is more than cutting it in two. We are, of course, right here on the seaboard. We have no trade in the West. We cannot hope for much trade there on account of the freights being against us; and we would be greatly affected. Of course, the Western mills have their inland charge from the seaboard to the West. I have felt that with the Tariff Board investigating these matters, if there is any possible chance to make a change later, after all the information is in, it would be time enough to do it then. But we have been working under this law only a very short time, and it made quite a reduction from the former duties; and to make any such radical change as this would practically put us out of business.

Effects of Previous Tariff Reduction

SENATOR SIMMONS: Did the former reduction result in any increase in importations to this country?

MR. WORTH: I do not know that it did because the conditions during the time this bill has operated have been against any importations. You know they have had a very high market on the other side, and we have had a very low market here. If you reverse the conditions and we happen to get into good business here again and they should be in poor business, then you would see that stuff come over here at once. That is what we want to guard against, because we cannot make any money today, and we want to get into a position where we can.

SENATOR SIMMONS: But as a matter of fact the reduction from 5-10 to 3-10 cent a pound did not result in increasing the importations?

MR. WORTH: No, not to any large extent. The conditions did not warrant it at all.

SENATOR SIMMONS: I should like to know if there have been any exportations in the last year or two, and if so how much?

MR. WORTH: There has been quite a considerable amount exported. The United States Steel Corporation, of course, export very largely. We have not gone into that. We have sent some little material recently down to New South Wales; but we do not make a general business of exporting, although in times past we have exported plates to Scotland. That was a pretty hard thing to do, and I assure you we made no money out of it.

SENATOR HEYBURN: If you can compete with the Scotch you are pretty safe.

MR. WORTH: It was more of a card than anything else. It was to the Babcock & Wilcox people, who have quite a boiler plant here, and I think that is the parent plant there. They wanted our plates there; but we found we could not do it at all, and it resulted in a heavy loss to us.

Return on the Investment

SENATOR CLARK: What is the capitalization of your concern?

MR. WORTH: $250,000.

SENATOR CLARK: What is your annual output?

MR. WORTH: We have increased quite a little and put up some additional furnaces since the business has fallen off. The largest output we have ever made was about 225,000 tons per year.

SENATOR CLARK: What is your capacity?

MR. WORTH: Now we can make about 350,000 tons. We operate from about 2500 to 3700 men. We are running about from 2200 to 2500 now. Part of that is at our tube works.

SENATOR CLARK: What dividends have you been paying?

MR. WORTH: You know, we only have a $250,000 capital, and of course it is a family concern. There are only four or five stockholders in it. The stock is not on the market at all, and there is only one share held outside of the family. That is held by the attorney of the family. We have paid 30 per cent., or $75,000 a year, for a long while, because we did not pay anything at the start.

SENATOR CLARK: What is the book value of your plant at the present time, growing out of this original investment of $250,000?

MR. WORTH: It is between $7,000,000 and $7,500,000.

THE CHAIRMAN: When did you start your works?

MR. WORTH: They were started by my father, I think about 1851.

THE CHAIRMAN: For a long period they did not pay anything; did they?

MR. WORTH: They did not pay anything at all. We came pretty near failing there at one time. My father's partner did fail, and we were down in the depths for a good while. Finally, after about 1899, we commenced to get on our feet. We did not make much money until then.

SENATOR SIMMONS: The value of your plant today, as compared with what it originally cost, must represent the earnings that have gone back into the business?

MR. WORTH: That is right.

SENATOR SIMMONS: You started with $250,000?

MR. WORTH: And some borrowed money which, of course, was put in along to build the plant.

The Question of Iron Ore Duty

SENATOR CLARK: Are you a buyer of iron ore?

MR. WORTH: Yes. We are getting some Jersey ore, also some Spanish ore. We get some from the Lakes. We are shipping some Nova Scotia ore; and we are expecting to get some from Texas in a short time, around by boat. Of course the Western people have a great advantage over us in having their own mines. Those fields have been largely corraled by the Corporation, you know, and other large interests of the West, and we of the East are not interested out there. I think that at present we are importing about 33⅓ per cent.

SENATOR SIMMONS: The duty on ore was reduced in the Payne-Aldrich bill. It is proposed in this bill to reduce it further. That is a revenue duty, is it not? That is, it is a revenue duty in this sense: the duty on ore does not affect the price of American ore to any considerable extent, does it? I mean that as a result of reducing the duty on ore the price of American ore has not fallen?

MR. WORTH: The price of ore has not been lowered very much until this year. It will be reduced this year.

SENATOR SIMMONS: Is that on account of the tariff?

MR. WORTH: No; it is on account of poor business.

SENATOR SIMMONS: The point I was making was this, and I wanted to get your views about it: I had been disposed to think that the duty on iron ore, in view of the fact that we do not import much, and we have such large deposits in this country, was a revenue duty; that it did not afford really any protection, or, if any, very little to the price of iron ore in this country.

MR. WORTH: Yes; I think it is practically a revenue measure today. I do not know that the iron ore producers of the Northwest require very much protection, because they have such fine bodies of ore there and can produce so cheaply.

SENATOR HEYBURN: Is there any available supply of iron ore known to exist in our own country today—I mean available to the independents?

MR. WORTH: I do not know of any considerable body. I think ore in this country is very tightly held. * * * I will say here that I do not agree with Mr. Snyder's representative's statement here yesterday, at all. I think a duty of 50 cents on ore would be perfectly ridiculous. We in the East would be practically put out of business. We would have no protection. They would not come to us to try to market their ores at a price at which we could compete with other manufacturers if they had 50 cents a ton duty on foreign ore. With a 15-cent duty on foreign ore they come down to see us. * * *

Pacific Coast Trade in Plates

SENATOR HEYBURN: You can ship plates to the Pacific coast to compete with the importers from Germany and other countries, can you?

MR. WORTH: No; we have trouble there sometimes. The Belgian manufacturers knock us out very largely; and I think just at present we are doing almost no business in California. We should do it.

SENATOR HEYBURN: Do you ship any rolled plates to be made into water pipes?

MR. WORTH: Yes; that is another use.

SENATOR HEYBURN: I have some personal knowledge of some people that I used to be connected with that bought ten miles of your pipe, that were located about 600 miles back from the coast, to make placer-mining pipe.

MR. WORTH: Was not that all fabricated, though, right close to the coast?

SENATOR HEYBURN: No; it was made on the ground. It came in plates, and was riveted with a riveting machine. That is the reason I want to know whether or not you can compete with the import trade 500 miles back from the coast.

MR. WORTH: We get that business at times and at other times we do not. That is the reason I am here to protest against any reduction in the present tariff duties. I think they are just as low today as they should go.

Statement of A. F. Huston, of the Lukens Iron & Steel Company, Coatesville, Pa.

MR. HUSTON: I consider it will be disastrous to our line of business to reduce the duty as proposed. We are already just on the balance point. I might state that we ship more steel plates to the Pacific coast than any other concern. The German plates are quoted cheaper than we can get overland to the Pacific coast, but we are able to hold and get some advantage in price. They would rather deal with the home maker; but if there is a lowering in duty, naturally the whole of that territory will go to the Germans or other foreign countries. The Germans seem to be the most progressive and make the lowest prices. What would occur on the Atlantic coast I do not know; but I am very sure all the Pacific coast would go, and we could only hold the Atlantic coast by radical reductions in wages.

THE CHAIRMAN: How many men do you employ?

MR. HUSTON: In busy times we employ from 1500 to 2000 men. Of course we are not employing that many now. We have seen the ups and downs whenever there has been a proposed change in the tariff. And it paralyzes business until we know where we are. I have been through several of them, having been in business continuously for forty years this coming summer.

THE CHAIRMAN: This agitation about tariff revision has had a serious effect on your business?

MR. HUSTON: It has; so that we have been running part of the time only 40 per cent. At present we are probably running 50 per cent. or a shade more. But we have not for a good while been running anywhere near capacity. And I might say that at present, and for some time past, we have been having to take orders below cost. We want to keep the works moving, keep our men employed, and we figured we could better lose some money in taking business to tide over a bad time than to shut down our works and destroy our organization and our place in the trade. * * * I do not know of anything further that I could add to that. I desired to say just a few words to state my position.

Statement of R. D. Campbell, of the Allegheny Steel Company, Pittsburgh

MR. CAMPBELL: I represent the Allegheny Steel Company, of which I am secretary and treasurer. I also have the honor to appear for the independent makers of sheet steel, an industry with an estimated direct investment of $35,000,000. The plants represented are widely scattered from the Atlantic Coast to the Mississippi River, and employ approximately 27,000 persons, generally skilled and

intelligent workmen, and among the best paid of any class in the country. Also depending on this industry there is an additional investment of many millions of dollars and thousands of workmen employed mining ore, coal and limestone, and in manufacturing steel, which is subsequently re-worked through various processes and finished in the form of steel sheets. In order to grasp the magnitude of this industry I submit a few statistics concerning the manufacture of sheet steel:

Number of separate companies engaged.....	33
Number of direct employees.....	27,000
Annual pay roll of sheet mills, estimated.....	$22,000,000
Total labor on ore, pig iron and steel before reaching sheet mills, estimated.....	$11,000,000
Total capital invested in sheet mills, estimated..	$35,000,000
Net tons of coal consumed annually, estimated..	7,000,000
Iron ore consumed per annum, gr. tons, etc....	3,600,000
Total water and rail transportation charges on entire tonnage of steel sheets and their antecedent raw material, estimated.....	$17,000,000

Home Cost and Foreign Selling Prices

Sheet steel is an article which is peculiar in the fact that it is of necessity hand made, and entirely distinct and separate from the other steel articles well known in commerce. Its cost, therefore, is largely made up of wages for labor. For instance, the sheet mill wages paid for a gross ton of No. 24 (which is a representative thickness) amount to about $11 and to-day's cost for this thickness is about $39 per gross ton in the Pittsburgh district. The selling price for the same material at European seaports is about $37.40 per gross ton. It is important to note that the domestic figures represent *cost* and that these costs are relatively as low as ever obtained in this market. The European prices used, however, are recent market *selling prices* at a time when the mills are full of orders and for this reason presumably operating at a profit.

The ocean carrying rates to Atlantic Coast and Gulf Coast points are $2.25 to $2.47 per gross ton, and from Liverpool, England, to Pacific Coast points, all water, $6.72 per ton. The House bill under discussion, paragraph 4, calls for an import tax on sheet steel of 15 per cent. ad valorem, amounting on the basis of the European selling prices above named to $5.62 per gross ton, or $45.27 delivered at Atlantic Coast points. Based on $39 home cost at Pittsburgh, with freight added, the following delivered cost would obtain:

	Freight.	United States cost, delivered.	European selling price delivered including 15 per cent. duty.
New York	16c	$42.58	$46.25
Boston	18c	43.03	45.35
Savannah	22c	43.93	45.25
New Orleans	30c	45.72	45.48
San Francisco	95c	58.00	49.73
Galveston	74c	53.80	45.48

You understand, gentlemen, the United States figures are all cost prices, whereas the European prices used for comparison are selling prices. The shipments of sheet steel to Atlantic and Gulf Coast and adjacent points for the year 1911 were estimated at 284,000 gross tons, and shipments to the Pacific Coast estimated at 137,000 gross tons. This tonnage for Atlantic Coast would doubtless be increased as much as 25 per cent. if points up to 200 miles inland were considered. It is obvious, therefore, that we are threatened with the loss of a large part of this sheet steel business to European mills. European sheet mill wages are less than 50 per cent. of those in this country and any reduction in the United States is sure to be attended with much distress and strife.

Comparison with Previous Duties

The following table indicates the import duties under the several recent acts and amendments for No. 24 gauge sheet steel. The figures are in cents per pound.

Black Steel Sheets		
Dingley Bill, 1897.....	0.8	cent
Payne-Aldrich Bill, 1909.....	0.6	cent
Proposed in House Bill No. 18,642.....	0.253	cent
Black, Pickled or Cold Rolled Steel Sheets		
Dingley, 1897.....	1.0	cent
Payne-Aldrich, 1909.....	0.8	cent
Proposed House Bill No. 18,642, 1912...	0.28	cent
Galvanized Steel Sheets		
Dingley, 1897.....	1.0	cent
Payne-Aldrich, 1909.....	0.8	cent
Proposed House Bill No. 18,642, 1912...	0.5	cent

A reduction is therefore contemplated of from 37 per cent. in galvanized sheets to 64 per cent. in black sheets.

We are confident that our equipment, facilities and methods are equal to those of European manufacturers and that our only handicap is the extremely low rate of wages paid by European mills. In order to continue operating at a profit we either must have more protection than is provided by the Underwood bill or else we must make a drastic deduction in the wages of our employees.

Sheets Given Same Duties as Heavy Materials

Furthermore, I wish to direct attention to the seeming inconsistency of this proposed bill in so far as it relates to sheet steel. This bill places sheet steel, which is a hand-made article, with labor cost of about $11 per ton, on a 15 per cent. ad volorem basis, and also places at 15 per cent. ad valorem steel beams, channels, angles, etc., which are produced mechanically at a very much less labor cost. In this connection it should be remembered that in recent years great improvements have been made in processes for rolling many of the heavier forms of steel by which labor cost has been greatly reduced, but with sheet steel little improvement has taken place and the process of rolling is just the same as it was 20 years ago. It does not follow because of this fact that 15 per cent. ad valorem is too high for the heavier forms of steel, but it certainly is too low for the sheet steel, in the manufacture of which so much labor is involved.

Evidently the question of labor and wages has been lost sight of entirely in the preparation of this bill. We, therefore, earnestly urge that careful consideration be given to a branch of the steel trade involving in its various aspects so large an investment and employment of labor.

We would also respectfully urge before final action is taken that the investigation and recommendations of the Tariff Board be considered, as undoubtedly the investigation of this board will be a distinct and valuable contribution in comparing manufacturing cost and conditions of the United States with other countries.

We also wish respectfully to suggest that specific duties are much preferable to ad valorem, as the latter basis opens the way for fraud in undervaluation, and at the same time will provide a high rate of duty when prices are high and the reverse when prices are low. This is certainly just as it should not be.

The Crucible Steel Industry

On February 13 Charles C. Ramsey, representing the Crucible Steel Company of America, Pittsburgh, Pa., appeared before the Senate Committee on Finance. Following are extracts from his testimony:

Testimony of Charles C. Ramsey

MR. RAMSEY: I would like at the beginning to have it clearly understood that the branch of the steel business I represent must be dissociated from the general steel business. That is, when we talk of 20,000,000 to 30,000,000 tons of production in a year it does not apply to us at all. Our business is comparatively small. The crucible steel output amounts to about 75,000 tons a year and it is made up practically altogether of labor. From 80 to 90 per cent of the cost of the steel we produce is labor, and when we consider that the average day's wage of the men in the mill is $4, as compared with $1.75 in Great Britain and Germany, you can understand the great need of protection to this industry. We have in the crucible steel industry, I should say, about 20,000 men employed.

SENATOR SIMMONS: Would you mind, in this connection, telling exactly what you make in your factory?

MR. RAMSEY: We make high speed steel, tool steels and alloy steels. When I say "tool steels" I embrace the whole tool steel list. That is cutlery steel, axe steel, steel for knives and razors and any kind of steel that requires a temper with an edge.

The Raw Materials Used

SENATOR SIMMONS: And your raw material is——

MR. RAMSEY: Perhaps I could bring it clearer to your mind by saying that we take the raw material where the other big mills leave off as their finished material.

SENATOR HEYBURN: Bars?

MR. RAMSEY: Bars and billets.

SENATOR SIMMONS: I want to ascertain where you get your raw material. Where do you buy your raw material?

MR. RAMSEY: We buy it everywhere. Some we bring in from abroad. Some of our alloys we bring in from abroad.

SENATOR SIMMONS: What proportion of it do you bring in from abroad?

MR. RAMSEY: A very small proportion. I should say about 2 or 3 or perhaps 5 per cent. We buy the balance in this country and make it up in mixtures.

(*Continued on page 624*)

Illuminated Dial Pyrometer

A recent addition to the line of electrical pyrometers manufactured by the Brown Instrument Company, Philadelphia, Pa., is a new illuminated dial indicator with an exceptionally long scale. This instrument is designed for use in furnaces or kilns where it is necessary for the operator to be at some distance from the dial. Front and rear views, the latter showing the way in which the dial is illuminated, are given in Figs. 1 and 2 respectively.

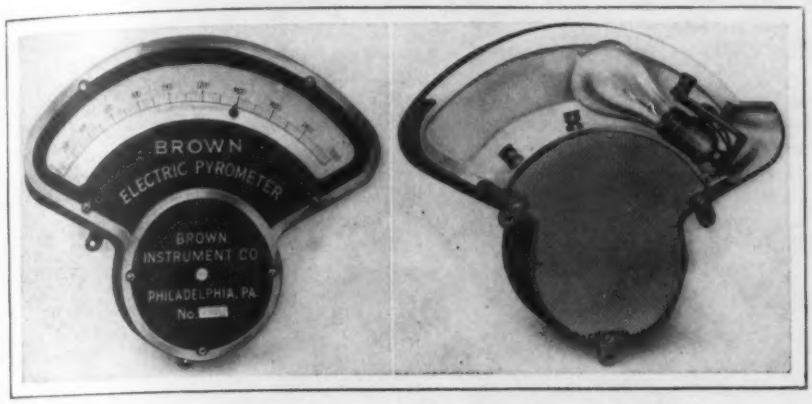


Fig. 1—Front View Fig. 2—Rear View

Two Views of a New Illuminated Dial Pyrometer Manufactured by the Brown Instrument Company, Philadelphia, Pa.

The instrument is furnished with a scale 12 in. long which it is emphasized will afford accurate readings, because of the open graduations. This illuminated dial instrument is especially intended for use in dark shops such as those where steel is hardened and heat treated and also for use in plants where work is carried on throughout the entire 24 hr. The scale is drawn on opaque glass and a 16-cp. lamp placed behind the scale, as shown in Fig. 2. This arrangement, it is emphasized, results in making the graduations and the pointer stand out clearly at a distance.

Scarcity of Pig Iron in Russia.—The Russian Ministry of Commerce, at a conference in St. Petersburg some weeks ago to discuss the shortage of pig iron in Russia, decided to continue to admit pig iron into the country at the preferential tariff granted some months previous. The shortage is attributed to a scarcity of ore. The bill authorized the importation of 10,000,000 poods, or about 180,000 net tons, of pig iron at the special tariff rates which are settled by ministerial order in each individual case. The difference between this special tariff and the ordinary tariff is refunded on presentation of documents proving receipt of the iron at one of the works receiving permission to import on special terms.

Imports of Canadian Ferrosilicon.—The statistics of pig iron imports from Canada to the United States in 1911, practically the entire amount classified in the Government statement as pig iron being electrolytic ferrosilicon, manufactured in Ontario, show a total of 4260 tons. In 1910 similar imports from Canada were 3175 tons and in 1909 2844 tons.

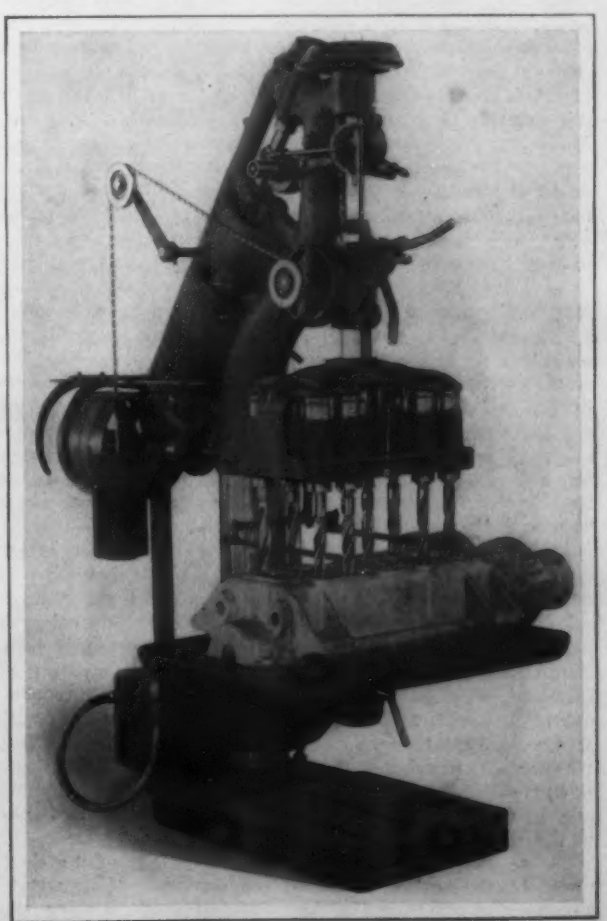
New 20 and 24-In. Geared Drills

With the development of the all geared drills, machines of a given size have acquired additional power above their rating as cone belt driven drills. The Barnes Drill Company, Rockford, Ill., in presenting its new 20 and 24-in. all geared drills, calls particular attention to the power of these machines. The 20-in. all geared drill is guaranteed to drive a 1-in. high speed twist drill at the rate of 1½ in. per minute in cast iron or 4 in. per minute in mild steel, without back gears. The 24-in. tool will drive a 1½-in. high speed twist drill at the rate of 5 in. per minute in cast iron or 3 in. per minute in mild steel. The transmission gears located on the diagonal shaft provide eight changes of speed, four without back gears, all of which are possible by the operation of the shifting lever without stopping the drill. The back gears also may be thrown in or out while the machine is running. Eight changes of feed for the 20-in. drill run from 0.004 to 0.049 in. per revolution of the spindle and for the 24-in. drill from 0.004 to 0.075 in. per revolution of the spindle. Provision is made for hand or full power feed with reversing friction pulleys for tapping or with reversing friction gears. Where the machine is equipped for tapping, it may be provided with an automatic reversing mechanism particularly adapted for depth tapping.

In the accompanying engraving a special eight-spindle auxiliary attachment is shown. Such an attachment can be furnished with from two to eight spindles. With two spindles the attachment can be made providing for adjustable centers, while for a larger number the centers are fixed. For such work as the aluminum crank case, illustrated in the accompanying engraving, the 24-in. geared drill with this auxiliary head is especially advantageous. All the auxiliary head spindles are driven from the main spindle of the drill and there is a special counterweight to offset the additional weight of the auxiliary head.

The specifications of the machine are as follows:

Size of tool, in.	20	24
Hight of drill, in.	70	78
Distance from column to center of table, in.	10¼	12¼
Maximum distance from spindle to table, in.	26¾	30
Maximum distance from spindle to base, in.	42	44½
Diameter of column, in.	5⅛	6¼
Diameter of table, in.	16	20
Diameter of spindle, in.	1 7/16	1¾
Diameter of crown gear, in.	7⅝	8⅜
Diameter of crown pinion, in.	4	4½
Vertical travel of spindle, in.	10	14
Vertical travel of table, in.	16	19¾
Morse taper of spindle	No. 3	No. 4
Ratio of back gears	4 to 1	4 to 1
Diameter of tight and loose pulleys, in.	10	12
Face width of tight and loose pulleys, in.	3	4
Speed of tight and loose pulleys, r.p.m.	400	325
Floor space, in.	37½ x 16	44 x 20



The New 24-In. Geared Drill with Auxiliary Head Attachment Built by the Barnes Drill Company, Rockford, Ill.

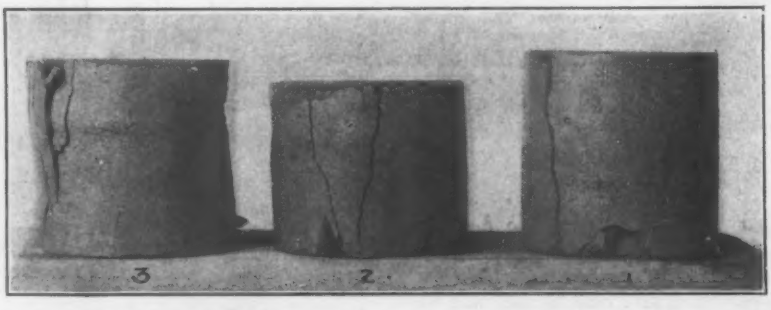
The Schumacher Briquetting Process*

Method of Making and Records of Tests

BY PROF. JOSEPH W. RICHARDS.

Fresh blast-furnace flue-dust mixed with from 5 to 10 per cent. of its weight of magnesium chloride or calcium chloride solution, that is to say with from 0.25 to 2 per cent. of its weight of magnesium chloride or calcium chloride, acquires the property of setting within a short time, from 15 to 60 min., and forming a hard cemented briquette. Alkaline solutions appear to have no action such as described, and they even interfere, if present, with the action of the magnesium and calcium solutions.

When treated in this way the flue-dust briquette sets very hard, apparently from pure excess of cementing and setting power. It is, therefore, possible to mix with the flue-dust a considerable proportion of inert ore or like material, which has no setting power by this process, and thus to make a compound briquette containing large quantities of ore mixed with flue-dust, but in which the flue-dust may be regarded as the cement or binding material. A particularly strongly cementing flue-dust will carry as much as three times its weight of fine ore or the like, and yet produce a satisfactorily strong briquette.



Schumacher Briquettes of Flue-Dust after Compression Test

The Cambria Steel Company has installed at Johnstown, Pa., a small plant consisting of two presses, with a combined capacity of 250 tons of briquettes per day. One of the presses is of the mechanical type, with hydraulic safety regulator; the other is a Ronay hydraulic press. The first makes briquettes the size of an ordinary fire-brick, the latter makes briquettes cylindrical in shape, 8 in. high and 8 in. in diameter and using considerably higher pressures than the former.

As seen in operation recently, the warm flue-dust from the dust-catchers was stored in one hopper, while fine Mahoning ore, containing from 10 to 12 per cent. of moisture, and quite cold, was stored in another hopper. A rotating feeding device formed a stream of these materials, passing into the mixing trough with an ordinary spiral, into which at the same time was run a 30 per cent. solution of calcium chloride, the flow of which was regulated by a hand valve. The trough fed the mixture directly into the hopper of the press. The flue-dust was warm, approximately at 200 deg. F.; the ore was ice cold; the solution was cold. The mixture fed to the press was just warm to the touch; the bricks going from the press were decidedly hot and steaming, and where loaded into the car they were quite hot to the touch and steamed vigorously. This heating of the mixture as soon as compressed into the briquette is a characteristic of the process, and is an index of the rapid chemical reaction taking place which results in the cementing of the material.

The flue-dust carries 18 to 20 per cent. of coke, which is all carried into the mixture, said mixture being 70 of ore to 30 of flue-dust. There is from 5.5 to 6 per cent. of coke in a finished briquette. The saving of this coke, 20 per cent. in weight of the flue-dust used, represents sufficient value to pay for the entire cost of the briquetting of the dust. Undoubtedly the coke thus enclosed in the briquette acts on the ore in the furnaces, and reduces it with at least as great an efficiency as the green coke put into furnace. Therefore if the furnace has sufficient smelting power, other things being equal, this coke of the briquette may be estimated as saving at least an equal weight of coke to the furnace.

As to physical properties, a briquette made of flue-dust, tested by the author, absorbed 11.5 per cent. of its weight of water, representing 27 per cent. of voids, a very satisfactory porosity. Briquettes one day old, hard dried, tested for compressive strength gave a minimum of 445 lb. per square inch. Photographs of three briquettes thus tested are here shown.

Several hundred tons of these briquettes were already in the ordinary furnace bins, ready for use in the furnaces, and appeared to have stood transportation to that point and a drop of 10 to 20 ft., and also subsequent action of ice and snow for several weeks without deterioration; only a few were broken, and but little dust was made.

The operation of producing briquettes in this manner, from flue-dust and fine ores, appears to have attained the maximum of simplicity, the operation consisting merely of mixing with solution and pressing into shape. Estimates of probable cost, if the operation were carried out upon a scale such as would suit a large blast-furnace plant, yielded as the outside figure 30 cents per ton, inclusive of depreciation, repairs and interest on plant.

The inventor of this process has certainly made a great advance in the art of briquetting these difficult materials at a minimum cost and with maximum simplicity of plant. It is not difficult to predict a very large application of this process in the United States, as soon as the behavior of the briquettes in the blast furnace has been proved. The very satisfactory running of similar briquettes in European blast furnaces appears to leave no doubt upon this phase of the question also. The process was discovered in 1908 by Dr. Schumacher, who observed what strong cementing properties were acquired by the flue dust when mixed with a small amount of certain salt solutions.

*Paper, substantially in full, presented to the American Institute of Mining Engineers.

Production of Pig Iron in Canada in 1911

The American Iron and Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in the calendar year 1911, in gross tons. The figures are as follows:

The total production of all kinds of pig iron in Canada in 1911 amounted to 824,345 gross tons, against 740,210 tons in 1910, an increase of 84,135 tons, or over 11.3 per cent. The production in 1911 was much the largest in the history of the Dominion. Of the total production in 1911 799,716 tons were made with coke and 24,629 tons with charcoal, coke and electricity, etc.

The production of pig iron in Canada in the last 18 years is given below, in gross tons. Spiegeleisen and ferromanganese are included. For all these years the statistics given have been compiled by the American Iron and Steel Association.

Years.	Tons.	Years.	Tons.	Years.	Tons.
1894	44,791	1900	86,090	1906	541,957
1895	37,829	1901	244,976	1907	581,146
1896	60,030	1902	319,557	1908	563,672
1897	53,796	1903	265,418	1909	677,090
1898	68,755	1904	270,942	1910	740,210
1899	94,077	1905	468,003	1911	824,345

The International Motor Company, manufacturer of Mack and Saurer trucks, announces that it has acquired the properties of the Hewitt Motor Truck Company, taking over all the business commencing March 1. Sales and executive departments on that date were amalgamated with the International Motor Company whose headquarters are at Broadway and Fifty-seventh street, New York City, with works at Allentown, Pa., Plainfield, N. J., and New York City. The range of sizes which this organization offers includes every variation in live road capacity ranging from 1500 lbs. to 10 tons. The Hewitt trucks have won a high reputation in the last few years in the service of wholesale coal dealers, lumber merchants, and engineering contracting firms, and their acquisition thus strengthens the line of heavy duty trucks offered by this company.

Sulphur Increase in Annealing

Results of an Investigation Dealing with Steel Castings

BY E. F. CONE

There has been some diversity of opinion on the question whether steel in annealing takes up sulphur into its composition. Whether the fact that it does is generally accepted or not, the following short study may prove of interest.

Many of the steel foundries in the East use a type of pit annealer in which the castings, sometimes large and small ones together, are brought up to the required temperature, soaked the requisite length of time, and then allowed to cool slowly. The fuel in general use is bituminous coal. Drillings taken from test bars attached to castings in such an annealer showed a higher sulphur content than the original steel, and so a few tests were run to determine the extent of this absorption.

It is the custom of the United States Navy to require 108 hours for the complete annealing of anchors, a period much longer than that required in the regular practice for steel castings. Drillings from a few anchors thus annealed were taken with the following results:

Heat.	Cup Analysis Per Cent. Sulphur.	Annealed Bars Per Cent. Sulphur.		Increase.
1	0.045	0.051		0.006
2	0.036	0.052		0.016
3	0.040	0.051		0.011
4	0.038	0.068 0.062	0.065	0.027
Average				0.015

An annealed test bar 1 x 3 x 8 in., of average heat treatment, was then machined so as to remove 1/16 in. at a time and these shavings were analyzed, the regular scale being discarded. The sulphur analyses were as follows:

Orig. Sul.	Outer Surf.	1/16 in.	⅛ in.	3/16 in.	¼ in.	5/16 in.	⅜ in.	7/16 in.	½ in.
0.034	0.136	0.053	0.046	0.039	0.036	0.036	0.036	0.036	0.036

Mixed drillings taken from this bar by simply drilling into it with a flat drill gave 0.059 per cent. sulphur. The total length of time to which this steel was exposed to the coal smoke and gases was thirty hours.

Eight annealed broken physical test pieces from locomotive engine frames of the same annealing were then drilled on the outside and on the inside about ¾ in. from the outside of the original bar, and analyzed for comparison. The sulphur results follow:

Heat.	Original analysis.	Annealed Outside.	Annealed ¾ in. Inside.	Maximum increase.
1	0.045	0.056	0.044	0.011
2	0.042	0.056	0.045	0.014
3	0.037	0.050	0.040	0.013
4	0.041	0.058	0.040	0.017
5	0.049	0.062	0.053	0.013
6	0.041	0.060	0.052	0.029
7	0.050	0.063	0.046	0.013
8	0.041	0.063	0.048	0.022
Average increase				0.016

Then from six annealed test bars from the same annealer drillings were taken from all over one side to the depth of about ⅛-in. and mixed. These same bars were also drilled in the fractured section about ½ in. from the surface and drillings mixed and analyzed for comparative results. The sulphur increases were as follows:

Heat.	Original analysis.	¼ in. Surface.	½ in. Inside.
1	0.036	0.051	0.036
2	0.035	0.055	0.038
3	0.036	0.052	0.037
4	0.036	0.056	0.035
5	0.036	0.040	0.035
6	0.039	0.044	0.040

It is evident from the above data that the absorption of sulphur by steel castings is considerable, depending, of course, upon the length of time they are exposed to the flame and upon the quality of coal. The grade of steel represented in the above tests was acid open hearth, and the coal used averaged below 0.1 per cent. sulphur. The average length of time the castings were exposed to the heat was 30 hours.

On the evening of February 16 the Lunkenheimer Company, Cincinnati, celebrated its fiftieth anniversary by giving a dinner and dance to its 1500 employees and their families. Over 5000 were present.

Chicago Prices of Old Car Wheels

The following table gives the average monthly prices, per ton of 2240 lb., of old car wheels at Chicago, averaged from weekly quotations in *The Iron Age*, for the past 12 years:

	1900.	1901.	1902.	1903.	1904.	1905.
January	$22.50	$16.00	$16.20	$24.00	$13.20	$16.56¼
February	24.00	16.50	17.25	24.00	14.12½	16.37
March	24.00	16.50	18.25	24.00	14.50	15.75
April	24.00	16.50	19.00	24.00	14.00	15.75
May	24.00	16.50	19.90	22.87½	13.12	14.81¼
June	20.25	16.50	20.62½	21.75	11.24	14.25
July	18.00	16.50	21.00	21.50	10.62½	14.37
August	15.20	16.50	21.00	21.37	11.12½	14.95
September	15.25	16.12½	21.00	20.25	11.10	15.62½
October	16.25	16.00	22.80	18.00	12.00	16.00
November	15.40	15.75	24.00	15.75	14.25	17.10
December	15.75	15.62½	24.00	13.00	16.25	18.75

	1906.	1907.	1908.	1909.	1910.	1911.
January	$19.00	$24.90	$19.10	$15.75	$18.37½	$13.00
February	19.00	23.50	16.93	15.25	17.75	13.00
March	18.60	23.87½	15.50	14.68¾	17.00	13.25
April	18.75	25.00	13.60	14.50	16.50	13.25
May	19.00	25.20	12.87½	14.81¼	15.75	12.75
June	18.75	25.37½	13.00	15.65	15.50	12.55
July	18.00	24.25	13.30	16.00	14.81¼	12.50
August	18.50	24.50	15.50	16.25	14.50	12.85
September	19.75	24.50	15.50	18.05	14.00	12.81¼
October	19.31¼	24.40	15.25	18.31¼	14.00	12.50
November	22.60	23.00	15.50	18.50	13.50	12.10
December	25.00	22.00	16.00	18.50	13.50	13.06¼

Elliott Cresson Gold Medal Awards

By recommendation of the Committee on Science and the Arts of the Franklin Institute, Philadelphia, Pa., the Elliott Cresson gold medal, under the provision of the deed of trust from Elliott Cresson, has been awarded to nine eminent men, as follows:

Alexander Graham Bell, of Washington, in recognition of "the value of his solution of the problem of the electrical transmission of articulate speech."

Samuel Wesley Stratton, of Washington, "distinguished and directive work in physical science and metrology and its application in the arts and industries."

Albert A. Michelson, of Chicago, "original and fruitful investigations in the field of physical optics."

Alfred Noble, of New York, "distinguished achievements in the field of civil engineering."

Elihu Thomson, of Swampscott, Mass., "distinguished work in the industrial applications of electricity."

Edward Williams Morley, of West Hartford, Conn., "important contributions to chemical science."

Johann Friedrich Adolph Von Baeyer, of Munich, Germany, "the many important results of his extended research in organic chemistry and of his discovery of synthetic processes of great industrial value."

Sir William Crookes, of London, "important discoveries in inorganic and analytical chemistry and of his pioneer work on the discharge of electricity through gases."

Sir Henry Enfield Roscoe, of London, "extended and important researches in the domains of inorganic, physical and industrial chemistry."

Copper Exports

The sustained foreign demand for American copper is shown by the following table of exports from the United States by months since January, 1907, in tons of 2240 lb.:

	1912	1911	1910	1909	1908	1907
January	31,229	29,357	26,699	19,190	33,019	17,039
February	34,643	18,992	25,238	13,886	24,640	9,174
March	....	23,300	19,963	20,824	21,670	13,432
April	....	27,466	13,062	28,333	31,853	17,363
May	....	26,655	20,832	31,473	22,640	9,036
June	....	30,074	23,430	33,774	29,999	16,470
July	....	34,955	22,875	35,046	17,840	14,774
August	....	29,018	27,876	22,916	25,906	13,458
September	....	25,745	21,733	20,207	19,428	17,157
October	....	21,904	27,917	23,876	21,962	29,161
November	....	26,431	30,441	24,028	19,346	34,087
December	....	37,430	31,526	28,104	21,890	37,685
12 months	....	336,506	301,590	301,657	290,193	228,836

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Some Possibilities of Free Machine Tools

A machine tool builder, in a letter discussing the results which would follow putting machine tools on the free list, brings out two elements of menace. He argues that as wages in the shops would inevitably be reduced, the difficulty of getting desirable boys as apprentices and as students of trade schools would be vastly increased. His other point is that the cost of the designing department would be larger or else the salaries of designers would have to be smaller, for it would be necessary for the machine tool manufacturer to redouble his efforts to keep ahead of foreign competitors in quality of product.

This matter of maintaining a high efficiency among the mechanics of the country is serious enough as it is to-day. The trade is not highly paid in comparison with others which require no more intelligence and generally less. According to the experiences of employers the parents and the boys themselves, in casting about for a life work, are not naturally attracted by the mechanic's trade. Presuming that it promises as great prospect of advancement as others, the boy looks upon it with disfavor because it involves overalls and not quite presentable hands. The standard of the American youth in many families seems to call for a different class of work. In a very great percentage of cases the boy makes a mistake in this judgment, but the fact remains that such is his attitude, and in it he is frequently backed up by his parents. Employment in a store or office is more to his taste, even though his chances of getting ahead to a real success in life are probably less. As compared with most other trades that of the machinist would seem to be an attractive one, excepting that it is not well paid, considering the ability required. To reduce the financial attraction would produce a condition very much more difficult to overcome in recruiting the new generation of machinists.

As for the designing department, the argument is easily followed. Curiously enough the common opinion is that the American machine tool builder could not afford to spend as much money on this department if the price of his product had to be lowered. If this idea should be followed out the error would be a fatal one. The foreign builder has succeeded in producing machinery which would appeal to the American user only because our machinery has been copied to minute details. His hope is that American buyers will be glad to take a practical duplicate of an American machine at a lower price than that at which the domestic product can be sold. Probably in a great many cases the user of machinery would prefer to pay more money for equipment built in his own country; but doubtless the invasion would meet with sufficient success to make serious inroads on the market here. The only way the Americans would be able to meet this competition would be to keep their machines always a little better than those which have been copied. To do this would require a continued, concentrated effort on the part of designing departments, which surely could be no smaller and probably would have to be larger. The cost would have to be regulated by the salaries paid the men who do this work.

Consequently, not only would free machine tools make the mechanical trade less attractive to the boy, but this branch of mechanical engineering would appeal less to the young man about to enter upon an engineering course. Considering the case in its broadest

aspect, the placing of machine tools on the free list would do practically no good to anybody in the country. Users of machine tools might get some part of their equipment a little cheaper, but the loss to these same interests directly and indirectly would be greater than their gains.

Steel in Box Car Construction

In the early days of steel car construction, when the merits of steel and wooden cars were being canvassed, it was thought that the box car was more or less in the same class as the gondola or hopper, but the actual development was that the latter became almost general without the steel box car receiving much attention. A very large proportion of box cars built in recent years, of course, have had steel underframes, which gave a fresh consumption of steel amounting to several tons per car.

Serious attention is now being directed to the all-steel box car. The Pennsylvania Railroad, for instance, is building 300 of a pattern it has developed, and some of the steel car builders have worked out complete designs for all-steel box cars. It is recognized that the case of the steel box car is much more complicated than was that of the steel hopper or gondola, for in the latter the stresses to be resisted were fairly well understood, and the requisite strength for different members could be computed with considerable confidence. With the steel box car the question is one of stiffness and of resistance to various forms of abuse, without there being available any definite information as to the comparative value of wood and steel.

Steel has been entering by degrees, rather than suddenly, into box car construction. The use of steel underframes has become familiar, but it may not be so generally known that the all-steel roof has lately begun to find favor. Instead of building the car with a wooden top, and a galvanized corrugated sheet rain protection underneath the wood, a practically all-steel roof is being used in some quarters, the entire top being steel except for a wooden running board along the center for the convenience of the train hands. This steel roof is not only protection against weather but is its own support. Such a box car roof weighs about a ton, or about four times as much as the steel sheets used in ordinary box car construction to keep out the weather. The New York Central Lines are now having built several thousand box cars with all-steel roofs. These cars, which of course are steel underframed, will leave only the sides, ends and floors of wood.

It is not altogether certain to what class of mills the orders for box car material will fall—when the orders do come. There has long been a twilight zone between the plate mills and the jobbing sheet mills, including material thinner than 3/16 inch thick, but not thinner than No. 12 gauge, which is about 7/64 inch thick. Sometimes the one class of mills obtains an order falling in this intermediate zone, and sometimes the other class, while the distribution of orders frequently varies according to market conditions prevailing in the two industries. The jobbing mills will probably claim the preference in the case of material for box cars, since No. 12 gauge shows promise of being a favorite for this construction, and the claim is made that it is difficult to roll a wide plate flat enough for the purpose in a plate mill, while jobbing mill practice makes this relatively easy. Some of the plate mills, however, may find it possible to improve their practice when they see that there is a prospect for a large tonnage of this particular class of material.

Mishandling Machinery in Ocean Transit

Manufacturers of machinery make vigorous complaint of damage in transit to machines shipped to European ports. The percentage of loss on this route is very much greater than that which occurs to shipments in this country or to Australia, South America and other more distant points.

Methods of handling expensive machinery at the docks of the European steamship companies, both at the American and European terminals, are particularly careless, even grossly so. It has been claimed that the American manufacturers have not been sufficiently careful in boxing or crating machinery and consular reports have laid much emphasis on this fact, but on the other hand a recent statement from the Government is to the effect that the machinery builders of this country now excel in this respect. As a matter of fact, the transportation companies have always blamed the loss of machinery to the boxing.

American manufacturers who ship machinery abroad have given the matter of protection in transit very serious study. In many cases they have called in experts to evolve methods. But no protection can save machines that are handled without regard to their safety, in dropping them into the holds of vessels. The winch operator is not careful in bringing them to the bottom of the fall with reasonable gentleness. In unloading, the boxes are shot down an incline and then propelled across a dock by the impact of another piece of heavy freight following close after them. It is even charged that in some countries dock hands deliberately mishandle American machines as a sort of protective tariff for machinery manufacturers among their fellow countrymen. Protests and complaints to the shipping agents and the steamship companies have little effect, and the recovery of damages is well nigh impossible. A guarantee that the machinery has not been injured during its journey from the home factory to the steamship dock is demanded. Apparently some method of inspection or watching will be necessary before this exasperating loss to the builder and serious inconvenience to the customer can be stopped.

Saving on Part Carload Shipments

In one of the manufacturing districts of the United States, where a considerable number of metal working plants in related lines of production are located close together and largely along a single belt line, it has been a fact well recognized by all of them, for some years past, that their customers were to a considerable extent the same. For example, when a sizable contract was let for equipping some new shop, mill or factory, certain items were pretty apt to be distributed around among the manufacturers in this district. As a result, there has come to be a good deal of co-operation between them in aiding one another to secure new business.

Recently one company engaged an expert traffic manager to look after its increasing volume of shipments; and in looking around for opportunities of saving money on freight it occurred to him to ascertain whether combinations of less-than-carload shipments

could not be effected with some of the neighboring concerns on freight destined for common points. Accordingly, he made a series of visits among them, with a view to ascertaining some of the orders that they then had in hand and checking off on a list of his own concern's impending deliveries various combinations that might be considered. Where sales had been made to the same customers, as proved to be the case in a surprising number of instances, the deliveries scheduled were usually identical; and this facilitated such an arrangement. It also developed, in many other cases, that, where neighboring plants had nothing ordered from the same concern, they did have freight for some user in the vicinity, and this also enabled combination shipments to be arranged, as haulage by team or autotruck at the other end was ordinarily involved in any event. In loading it was sometimes necessary to deliver by wagon from one plant to another, although the saving on loads of any size made it cheaper to pay a small switching charge.

This system worked out so well that the plants chiefly interested, with others that have asked to "come in," are now considering the establishment of a common traffic bureau, as they have found various additional means of co-operating in respect to obtaining cars, tracing shipments, collecting claims for overcharge or damage, etc., and material benefits have resulted. The railroad companies also give them considerably better treatment all around and are, in fact, disposed to encourage the movement. It has enabled them to handle the outbound shipments with less cars and also obviated a great deal of friction and ill-feeling due to previous misunderstandings or apparent neglect, charges of favoritism, etc. Traffic associations among shippers are, of course, nothing new; but the idea which led up to the co-operation above mentioned seems to be capable of application in many different ways and therefore has suggestive value.

Underwood Metal Schedule Supplement

In its issue of January 25, printed the day following the introduction of the Underwood bill reducing the duties in the Metal Schedule of the Payne tariff act, *The Iron Age* gave its readers the full text of the bill. Side by side with the proposed ad valorem duties, for ready comparison, were printed those now in force, which are chiefly specific, together with their ad valorem equivalents figured from the import statistics of last year. No other publication of this information in this form has been made, and our Supplement containing it has therefore been in demand in the iron and steel and metal working trades. A limited number of copies can still be sent to subscribers who desire them.

Correspondence

Competition of Foreign Welded Steel Pipe

To the Editor: In your report of the hearings before the Senate Finance Committee on the proposed reduction of tariff duties on iron and steel products, a statement is made by D. J. Driscoll, of the Delaware Seamless Tube Company, as follows:

> The pioneer and leader in the manufacture of seamless steel tubing is Germany. She has developed and brought its manufacture to a high state of perfection, and the length of time she has been manufacturing has trained a great number of hands skilled in the art. This fact, together with her low labor cost, which is about one-third of what it is in this country, enables her to produce tubes at a cost so low that she competes with us, even with the present duty of 30 per cent ad valorem.

Not long ago I had the opportunity of visiting the leading Germany mills and, except for Mr. Driscoll's estimate of labor costs abroad, which I think is a little low, in view of recent wage advances, I agree very thoroughly with his statement of the facts.

Furthermore, they apply far more than is generally supposed to welded steel pipes and tubing also. As an illustration of this I will cite a visit just paid to a large hydroelectric plant of the Northwest, situated about 1200 miles from the Atlantic seaboard. From the intake at the dam to the power house there were used 5848 ft. of wood stave pipe from the Pacific Coast Pipe Company, 3100 ft. of lock bar pipe from the East Jersey Pipe Company and 2233 ft. of welded steel pipe, for the zone of extremely high pressures, terminating at a surge tank, which was purchased from Thyssen & Co., Mülheim-Ruhr, Germany. This pipe had to be carried in barges down the Ruhr and Rhine rivers to one of the North Sea ports, transshipped to a steamer for New York, carried by rail to Buffalo, by lake to Marquette, Mich., and again by rail to its destination. I do not think that price had much to do with this purchase. The pipe was bought on quality, and from what I saw of similar installations abroad I would have made the same recommendation that the engineer in charge of this construction work did. But the fact that such pipe can be laid down at a profit to German manufacturers, when destined for a point so far in the interior of the United States, shows what the possibilities are. I believe that the facts presented by Mr. Driscoll, with similar testimony, cannot be given too careful consideration.

C. A. TUPPER.

MILWAUKEE, WIS., March 2, 1912.

Business Men Appeal to Government

The following resolutions, presented by W. H. Stackhouse, Springfield, Ohio, were adopted February 28 at a meeting of business men and manufacturers, held in Cincinnati, under the auspices of the Business Men's Club, after hearing addresses by ex-Senator J. B. Foraker and others:

> Recognizing that capital and labor constitute essential parts of industry and that without their friendly co-operation neither can prosper, both being interdependent, and, also recognizing the further fact that both industrial and labor combinations, operating under proper restrictions, are necessary to the successful conduct of our country's constantly increasing volume of business, be it
>
> *Resolved*, That in our opinion the present apprehension of our country's enormous commercial interests, caused by the general depression during the last few years, makes of paramount importance the vigorous co-operation of all engaged in commerce and industry, the rank and file of employers and employees:
>
> 1. To differentiate between the corrupt practices on the part of a few as against the sound business policies of the large majority.
> 2. To abate the present method of indiscriminate attacks upon all industry because of the obviously dishonest methods of the few.
> 3. To prevent the great body of honest business from being crippled because of the dishonest acts of the small minority.
> 4. To induce the governmental authorities to co-operate with them in stimulating all industry by the enactment of equitable remedial legislation, constructive in character, specific in its provisions and sufficiently comprehensive in scope to cover the legal operations of all industrial and labor combinations under proper safeguards, including governmental supervision and regulation, and be it
>
> *Further Resolved*, That we impress upon the agents of the Government their paramount duty to the whole people, which is to promote progress and prosperity consistent with sound and conservative business ideas and methods.

Proposed Commission on Industrial Relations

The recommendation of President Taft that an industrial commission be appointed by Congress to investigate the relations of employers and employees in the United States, has been embodied in a bill, which has been introduced in the Senate and the House of Representatives at Washington. It provides for the Commission on Industrial Relations, consisting of nine persons to be appointed by the President, including not less than two employers and two representatives of organized labor. The commission is authorized "to hold sittings and public hearings anywhere in the United States, to send for persons and papers, to administer oaths, to summon and compel the attendance of witnesses and to compel testimony, and to employ such secretaries, experts, stenographers and other assistants as

shall be necessary to carry out the purposes for which such commission is created, and to authorize its members or its employees to travel in or outside the United States on the business of the commission."

The scope of the commission's work is indicated in the following:

The commission shall inquire into the general condition of labor, especially in the principal industries of the United States, and especially in those which are carried on in corporate forms; into existing relations between employers and employees; into the effect of industrial conditions on public welfare and into the rights and powers of the community to deal therewith; into the growth of associations of employers and of wage earners and the effect of such associations upon the relations between employers and employees; into the extent and results of methods of collective bargaining; into any methods which have been tried in any State or in foreign countries for maintaining mutually satisfactory relations between employees and employers; into methods for avoiding or adjusting labor disputes, through peaceful and conciliatory mediation and negotiations; into the scope and methods and resources of existing bureaus of labor and into possible ways of increasing their usefulness. The commission shall seek to discover and to point out the underlying causes of dissatisfaction in the industrial situation.

The commission is required to make a final report to Congress within three years, and partial reports in its first and second years.

From Ore to Woven Wire Fencing

One of the most elaborate of recent illustrated presentations of iron and steel making is given in a series of 31 heavy sheets, 9⅜ x 12⅜ in., tied with cord, making the equivalent of a considerable volume. The publication issues from the office of Frank Baackes, general sales agent of the American Steel & Wire Company, Chicago, and is an illustrated lecture delivered by John W. Meaker, Jr., manager of the woven wire fence department of that company, before the Retail Hardware Association of Illinois. The text is a description of the various processes beginning with the ore in the Lake Superior district and ending with wire fencing. There are 91 illustrations, covering the mining of the ore, its transportation and unloading, and the operations of the blast furnace, Bessemer steel works, blooming mill, rod mill and all the various steps in the processes of wire mills and fencing plants. There has been an excellent selection of subjects for illustration and the views are clear and effectively grouped.

Iron and Steel Works Directory

The American Iron & Steel Association, 261 South Fourth street, Philadelphia, Pa., announces the publication of its Second Supplement to the Directory to the Iron and Steel Works of the United States, which brings down to the close of 1911 all essential details concerning new iron and steel plants which have been completed or undertaken since the appearance of the complete Directory of 1908. It also gives important changes that have since taken place in the ownership and equipment of plants that have previously been described. It further contains a complete list of the blast furnaces in this country that were in existence or were under construction at the end of 1911, whether built or undertaken since the appearance of the Directory of 1908 or previously. Supplementary to the information concerning blast furnaces is a new department devoted to electrical and ferroalloy plants which are identified with the iron trade or are largely dependent upon it. The price of this Supplement is $5 per copy.

Republic Iron & Steel Company Dividend Passed

Chairman John A. Topping, of the Republic Iron & Steel Company, made public the following statement on Monday, February 26:

"At a meeting of the Executive Committee of the Republic Iron & Steel Company, held February 26, 1912, it was unanimously decided to defer payment of the quarterly dividend of 1¾ per cent. on the preferred stock, due and payable April 1, as present and prospective earnings are not sufficient to warrant full payment, and it was the judgment of the committee that under existing conditions of business, tariff uncertainties and political agitation, it was to the interest of the stockholders to conserve the company's cash assets. The company is operating at approximately 90 per cent. of capacity, and if current prices are maintained they will insure a profit. The net quick assets are approximately $12,500,000, which places the company in a strong position and will enable it to carry through such improvements as are necessary; and when normal conditions of business return the earning power of the property will be sufficient to discharge its dividend obligations."

The company's statement for the second half of 1911, published about one month ago, showed that the net profit applicable to dividends was $76,000 less than the $875,000 required for six months' dividends on the preferred stock. In the corresponding period of 1910 the net profits were $392,000 more than amount of the preferred dividends. For the entire calendar year 1911 the net profits were about $200,000 in excess of preferred dividend requirements.

Longevity Records for Motor Trucks

Convincing evidence of long service for a motor truck is offered by the International Motor Company in the fact that the first Saurer truck, manufactured at Arbon, Switzerland, by Adolph Saurer as an experimental machine for transporting embroidery machines over the Alps in 1894, is still in active service at the Arbon plant. The 17 years' service is mentioned particularly because the depreciation factor, sometimes placed at 15 per cent., is widely regarded as indefinite owing to the short period of existence for the great majority of motor trucks now in use. Incidentally it is claimed, partly doubtless on the basis of the pioneer work of Adolph Saurer that the Saurer and Mack trucks are the oldest in point of service of any machines on the market. It is not generally apprehended that the commercial motor vehicle has had an estimated growth in three years of at least 500 per cent.

The International Motor Company also claims that the Mack truck built in Brooklyn in 1900 at the original plant, that of the Mack Bros. Motor Car Company, as a sightseeing bus constructed for Isaac Harris, Brooklyn, and used by him in Prospect Park, that city, has passed through a number of users' hands and for seven or eight years has continued its history as a passenger vehicle in service in large cities of the East. About four years ago it was sold by its owner to a firm in Tucson, Arizona, which converted it into a freight carrying vehicle, and to-day, after 12 years' service, this original Mack truck, it is stated, is still in active commission.

A Good Pumping Engine Record

A remarkable performance of a 10,000,000-gal. Worthington pumping engine installed at Fall River, Mass., was recently noted in the annual report of John W. Moran, chief engineer of the Fall River water works. It appears that the engine ran 8599 out of a possible 8760 hr. in the year, or 98.1 per cent. of the time, and that the yearly duty, including every pound of coal burned at the station, was 90 2/3 million ft.-lb. under pumping conditions varying from a 3½ million to 11 million gal. per hour. Mr. Moran reports that he returned to the water board for the year 1910 $2,963.07 in coal saved, as compared to the best previous year in the history of the station, and that there was a saving in 1911 over 1910 of $504.70. This he has figured out to mean that after paying the interest on the original investment, he can establish a sinking fund at 3 per cent. and retire the cost of the pump in about 18 yr.

A New Ore Briquetting Plant.—The Northwestern Iron Company, Mayville, Wis., completed in the latter part of 1911 the building of a four-kiln Gröndal plant for the briquetting of iron ore. It has a capacity of about 400 tons a day. These briquettes are made from a mixture of flue dust and of Mayville ore taken from the company's own mine. The amount of flue dust has varied from 25 to 75 per cent. As originally installed the kilns are provided with two combustion chambers. It is now proposed to provide a third combustion chamber for each and this work is now under way. Hamilton & Hansell, New York, designed and built the plant. They are also consulting engineers for the erection of a briquetting plant at the Moose Mountain mine in Ontario. Alex Laughlin & Company, Pittsburgh, have the construction contract.

Pig Iron Production

Considerable Gain in February

March 1 Active Capacity 2500 Tons a Day More than that of February 1

With a net gain of seven in active blast furnaces in the month, February, with but 29 days, showed a greater pig iron output than January—the figures being 2,100,815 and 2,057,911 gross tons respectively, or 72,442 tons a day last month, against 66,384 tons in January. Steel works furnaces contributed almost all of the increase in output, the Steel Corporation making a net gain of five in furnaces active, while the independent companies made a net gain of three. The merchant furnace list showed a net loss of one in the month.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, beginning with January, 1911, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons.

	Steel works.	Merchant.	Total.
February, 1911	42,349	21,741	64,090
March	48,970	21,066	70,036
April	47,805	21,031	68,836
May	42,270	18,809	61,079
June	42,708	16,877	59,585
July	42,472	15,369	57,841
August	47,120	15,030	62,150
September	49,696	16,207	65,903
October	50,351	17,460	67,811
November	48,430	18,218	66,648
December	46,885	19,027	65,912
January, 1912	47,844	18,540	66,384
February	53,482	18,960	72,442

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in February and the four months preceding:

Monthly Pig Iron Production—Gross Tons.

	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)	Jan. (31 days)	Feb. (29 days)
New York	122,680	122,051	126,687	118,783	119,420
New Jersey	.....	.....	.....	.....	.....
Lehigh Valley	85,958	78,379	73,085	66,497	70,185
Schuylkill Valley	55,716	59,058	68,373	70,323	64,817
Lower Susquehanna and Lebanon Val.	37,687	40,158	39,818	41,334	41,169
Pittsburgh district	529,872	478,623	474,266	495,099	525,445
Shenango Valley	92,997	95,205	99,483	117,987	118,163
West. Penn.	101,030	87,689	103,138	106,708	109,552
Maryland, Virginia and Kentucky	55,768	51,659	48,501	45,716	38,393
Wheeling district	100,529	91,172	104,549	121,561	117,599
Mahoning Valley	228,248	208,991	210,903	218,221	224,200
Central and North Ohio	135,004	137,796	141,341	140,022	159,562
Hocking Valley, Hanging Rock and S. W. Ohio.	24,750	22,089	23,680	32,495	34,627
Chicago district	288,581	288,274	268,362	245,046	250,333
Mich., Minn., Mo., Wis., Col., Wash.	68,064	58,398	73,707	69,351	65,192
Alabama	150,219	153,901	161,884	145,830	137,720
Tenn., Georgia and Texas	25,044	25,990	25,493	22,938	24,438
Total	2,102,147	1,999,433	2,043,270	2,057,911	2,100,815

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons.

	Pig. Total production.			Spiegeleisen and ferromanganese.		
	1910	1911	1912	1910	1911	1912
January	1,773,201	1,128,448	1,483,153	19,538	8,360	22,622
February	1,620,539	1,185,782	1,550,995	21,396	12,821	15,950
March	1,739,212	1,518,063	.....	25,591	11,784	.....
April	1,669,898	1,434,142	.....	22,304	10,657	.....
May	1,619,283	1,310,378	.....	26,529	13,641	.....
June	1,549,112	1,281,241	.....	27,680	22,611	.....
July	1,462,689	1,316,646	.....	22,924	17,067	.....
August	1,442,572	1,460,610	.....	25,756	14,579	.....
September	1,410,221	1,490,898	.....	15,151	17,757	.....
October	1,419,624	1,560,884	.....	8,500	19,697	.....
November	1,242,804	1,452,907	.....	9,032	19,678	.....
December	1,113,174	1,453,446	.....	12,178	20,698	.....

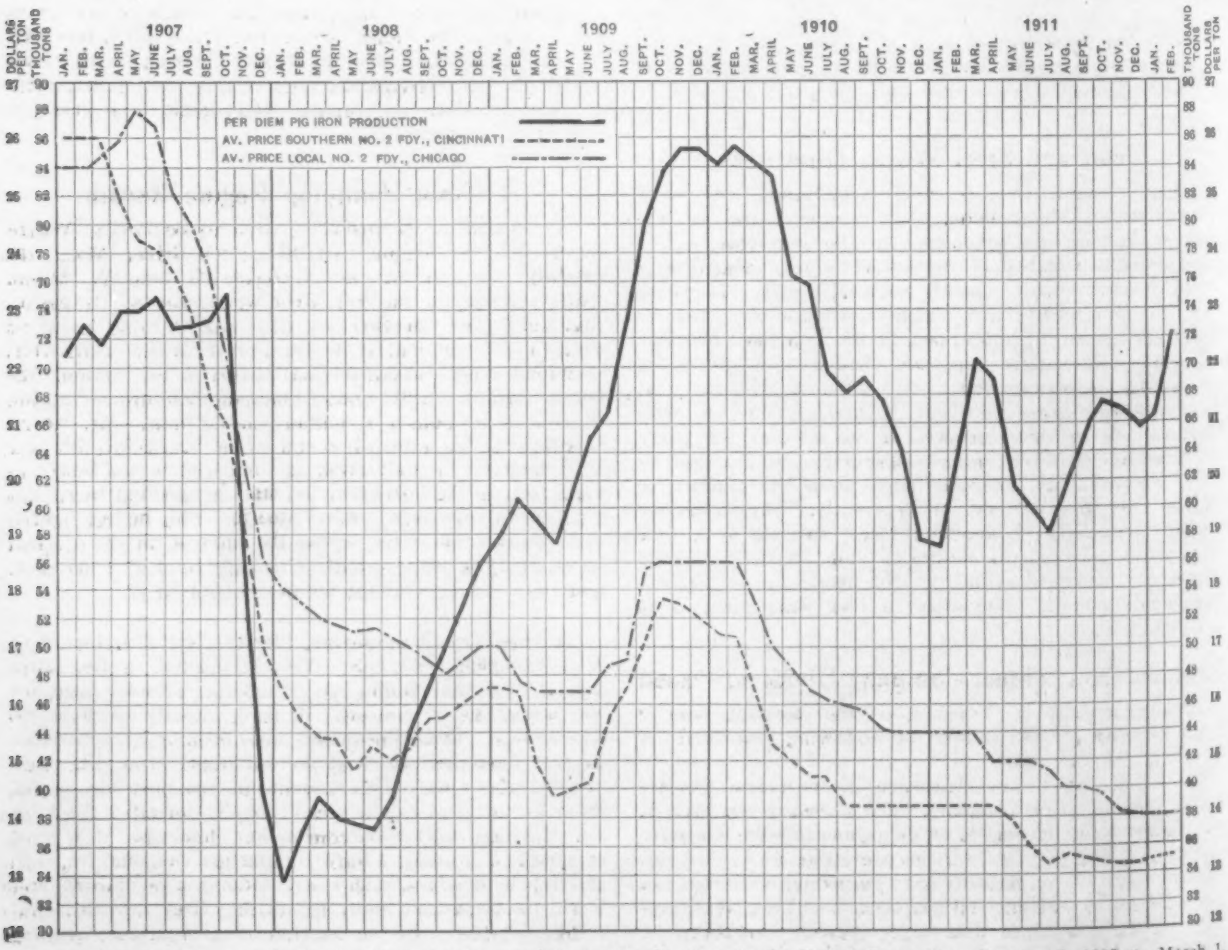

Diagram of Daily Average roduction by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to March 1, 1912; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Capacity in Blast March 1 and February 1

The following table shows the daily capacity of furnaces in blast March 1 and February 1:

Coke and Anthracite Furnaces in Blast.

Location of Furnaces.	Total number of stacks.	Mar. 1 Number in blast.	Mar. 1 Capacity per day.	Feb. 1 Number in blast.	Feb. 1 Capacity per day.
New York:					
Buffalo	17	11	3561	10	3441
Other New York	7	3	618	3	591
New Jersey	7	0	0	0	0
Pennsylvania:					
Lehigh Valley	22	10	2475	9	2104
Spiegel	3	1	100	1	100
Schuylkill Valley	16	8	2090	9	2310
Lower Susquehanna	7	2	608	2	522
Lebanon Valley	10	5	811	5	811
Pittsburgh District	49	44	18,278	40	17,432
Spiegel	4	3	335	4	610
Shenango Valley	20	12	4047	13	4128
Western Pennsylvania	27	14	3736	15	3765
Maryland	4	2	594	2	566
Wheeling District	14	11	4055	11	4015
Ohio:					
Mahoning Valley	24	20	7855	18	7240
Central and Northern	23	16	5805	14	5365
Hocking Val., Hanging Rock & S. W. Ohio	15	8	1195	8	1130
Illinois	31	23	8827	20	8165
Spiegel	2	1	120	2	135
Mich., Wis. and Minn.	10	5	1127	6	1366
Colorado, Mo. and Wash.	8	3	1017	3	1034
The South:					
Virginia	23	6	780	7	910
Kentucky	5	1	135	1	135
Alabama	46	18	4650	18	4520
Tennessee	20	7	822	6	708
Total	414	234	73,641	227	71,103

Among furnaces blown in in February were one Susquehanna at Buffalo, one Bethlehem in the Lehigh Valley, one Monongahela and two Aliquippa in the Pittsburgh district, Niles and one Haselton in the Mahoning Valley, Newburg and one Central at Cleveland, three South Chicago and one Gary in the Chicago district and Allen's Creek in Tennessee.

Furnaces blown out include Brooke in the Schuylkill Valley, Soho in the Pittsburgh district, one Shenango in the Shenango Valley, Perry in Western Pennsylvania, West End in Virginia, one South Chicago and one Gary in the Chicago district, and one Detroit in Michigan.

Chart of Pig Iron Production and Prices

The fluctuations in pig iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons

	1907.	1908.	1909.	1910.	1911.	1912.
January	71,149	33,918	57,975	84,148	56,752	66,384
February	73,038	37,163	60,976	85,616	64,090	72,442
March	71,821	39,619	59,232	84,459	70,036	.....
April	73,885	38,289	57,962	82,792	68,836	.....
May	74,048	37,603	60,753	77,102	61,079	.....
June	74,486	36,444	64,656	75,516	59,585	.....
July	72,763	39,287	67,793	69,305	57,841	.....
August	72,594	43,851	72,546	67,963	62,150	.....
September	72,783	47,300	79,507	68,476	65,903	.....
October	75,386	50,554	83,856	67,520	67,811	.....
November	60,937	51,595	84,917	63,659	66,648	.....
December	39,815	56,158	85,022	57,349	65,912	.....

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.

	1907.	1908.	1909.	1910.	1911.	1912.
Jan.	2,205,607	1,045,250	1,797,560	2,608,605	1,759,326	2,057,911
Feb.	2,045,068	1,077,740	1,707,340	2,397,254	1,794,509	2,100,815
Mar.	2,226,457	1,228,204	1,832,194	2,617,949	2,171,111	.....
Apr.	2,216,558	1,149,602	1,738,877	2,483,763	2,064,086	.....
May	2,295,505	1,165,688	1,883,330	2,390,180	1,893,456	.....
June	2,234,575	1,092,131	1,930,866	2,265,478	1,787,566	.....
July	2,255,660	1,218,129	2,103,431	2,148,442	1,793,068	.....
Aug.	2,250,410	1,359,831	2,248,930	2,106,847	1,926,637	.....
Sept.	2,183,487	1,418,998	2,385,206	2,056,275	1,977,102	.....
Oct.	2,336,972	1,567,198	2,599,541	2,093,121	2,102,147	.....
Nov.	1,828,125	1,577,854	2,547,508	1,909,780	1,999,433	.....
Dec.	1,234,279	1,740,912	2,635,680	1,777,817	2,043,270	.....

The Penn Steel Castings & Machine Company, Chester, Pa., recently cast a special steel stern post, 33 ft. high and 18 ft. across. Metal from two open-hearth furnaces was required, and was poured with two 25-ton ladles.

S. T. Wellman & Son

Announcement is made of the new engineering firm of S. T. Wellman & Son (H. G. Wellman), with offices at 8803 Euclid avenue, Cleveland. Probably no name is better known in connection with open hearth steel practice in the United States than that of the head of the firm. Mr. Wellman has been in California for the past four years, partly for rest and partly on business. He has given quite a little attention in that time to steel works engineering. Returning to Cleveland he decided to open an office to do a general business in steel works engineering, with special attention to open hearth steel plants and their accessories. For 40 years Mr. Wellman has had to do with the construction or operation of open hearth steel works and his well known open hearth charging machine is in use in all the steel producing countries of the world. He is still chairman of the board of directors of the Wellman-Seaver-Morgan Company, but the business of the new firm is entirely distinct from that of the above company.

Tap and Screw Making.—The American Society of Mechanical Engineers will hold a meeting on the evening of March 12 in the Engineering Societies Building, 29 West Thirty-ninth street, New York City, at which a paper will be presented on "Practical Problems in Tap and Screw Making" by Frank O. Wells, president and treasurer Wells Brothers Company, Greenfield, Mass. The paper will deal with the importance of size and lead in the cost of assembling manufactured work, the practical limits of accuracy, reasons for abandoning the V-thread, the proper size of tap drills, the power required for tapping, the effect of lubricants on size and power, etc. A number of prominent tap makers have been invited to discuss the subject.

Tar for Open-Hearth Furnace Fuel.—The Carnegie Steel Company is making experiments at one of its open-hearth furnaces at the North Sharon, Pa., works, using coal tar as fuel. The by-product coal tar is introduced into the furnace by compressed air. The matter is in a purely experimental stage, and nothing definite as to results can be said at this time.

What is called a frictionless drive covering a roller drive in which the driving roll has peripheral grooves fitting into similar grooves of the driven portion of the drive is treated at length in a paper by Charles E. Duryea, presented before the Society of Automobile Engineers. A reprint of the paper in pamphlet form has been issued, and a copy can undoubtedly be had for the asking by addressing the Charles E. Duryea Company, Saginaw, Mich. The paper includes such topics as loss in roller drive, chain and shaft drive efficiency, life of the roller drive, material and manufacture of it and its history and usage.

The Shenango Furnace Company, Pittsburgh and Sharpsville, Pa., presents in connections with its iron ore analysis booklet for 1912 a number of views illustrating the mining of Mesaba ore, its transportation and its smelting. One of the boats shown is the Col. James M. Schoonmaker, which is 617 ft. long and has a capacity of 14,000 tons of ore. The ores for which analyses are given are the Shenango, Tyrone, Webb and Whiteside, which are Bessemer; Wilpen, Webb and Whiteside, which are non-Bessemer, and the siliceous ores, Clifford and Antoine.

Scully, Jones & Co., Railway Exchange Building, Chicago, have been appointed exclusive sales agents in the Western territory for the Wilbraham-Green blower manufactured by the Wilbraham-Green Blower Company, Pottstown, Pa.; also exclusive agents for the core ovens, brass furnaces and other foundry equipment manufactured by the J. D. Smith Foundry Supply Company, Cleveland, Ohio.

The Northern Iron Company, Port Henry, N. Y., through its engineers, Frank C. Roberts & Co., Philadelphia, Pa., has awarded contracts in connection with its new blast furnace as follows: Plate and structural work, to the Union Boiler & Mfg. Company, Lebanon, Pa.; castings, to the Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa.

The Iron and Metal Markets

Steel Corporation Buys Iron

Also a Buyer of Steel Melting Scrap

Pig Iron Production March 1 at the Rate of More than 27,000,000 Tons a Year

The most important development of the week is the purchase by the Steel Corporation of round lots of heavy melting steel scrap and of both basic and Bessemer pig iron. Scrap has been bought in both the Chicago and Pittsburgh districts, and basic and Bessemer iron from Valley furnaces. Some basic iron may be bought in Eastern Pennsylvania, but nothing has been done as yet.

The Jones & Laughlin Steel Company has bought 15,000 tons of basic iron at close to $12.35 at Valley furnace, the iron being needed because cold weather cut down the output of its Aliquippa furnaces. A third furnace of this group will be started up next week.

In view of these purchases and of 10,000 tons bought by another Pittsburgh steel company, basic iron is firmer and Valley furnaces are now asking $12.50.

The February pig iron statistics reflect the increased output of steel products in that month of unusual handicaps to the entire industry. So great activity, under the serious drawbacks of this remarkable winter, it is argued, points to very heavy operations as open weather advances, and the past week has added weight to this reasoning.

For the 29 days of February pig iron production was 2,100,815 tons, against 2,057,911 tons in the 31 days of January. The daily average in February was 72,442 tons, or 6,000 tons more than in January. The steel companies were responsible for 5,650 tons of this gain.

That the Steel Corporation's share of the country's business in steel is still unusual, as was the case in January, appears from the fact that last month it produced 65,000 tons of pig iron more than in January, while the output of the independent steel companies was increased by but 3,000 tons. Five more Steel Corporation furnaces were in blast February 1 than on January 1; 3 more independent furnaces and 1 less merchant furnace, the net gain in active furnaces last month being 7 against 13 in January. A sixth Ensley furnace has been blown in this week by the Tennessee Company.

The industry entered March with a pig iron output at the rate of 27,100,000 tons a year, including charcoal iron, which is almost up to the record for a year, 27,300,000 tons in 1910.

The threat of an anthracite coal strike is more serious and there is added the prospect of a disagreement over wages in the bituminous districts of the Central West. An anthracite strike, as experience has shown, causes but a small reduction in pig iron output; as coke has very largely displaced anthracite at Eastern blast furnaces. The greatest hurt to the iron trade from any coal strike is in the shutting down of consuming industries. There is a more active effort in the past week to accumulate coke and prices for prompt shipment have stiffened further.

While new business recently has not been coming to the mills at a satisfactory rate, some producers, the leading interest in particular, make a more cheerful report this week as to specifications, and this is borne out by steel works operations.

The Carnegie Steel Company is adhering to 1.15c. for structural steel at Pittsburgh, and another producer has followed. There is evidence of greater strength in shapes than in plates and the amount of new work in sight is large. The Great Northern has placed 3400 tons more of bridge work, making a total of 7100 tons in two weeks. At Pittsburgh the new Monongahela hotel will take 8000 tons and the East End Savings & Trust Company building 6000 tons.

The Standard Oil Company has been in the market for 5000 tons of tank plates. Early awards are expected of four Pacific Mail steamers for which 30,000 tons of plates and shapes will be needed.

The Missouri Pacific has bought 12,000 tons of rails and the Rock Island is in the market for a considerable tonnage. The reported Santa Fe purchase is in reality only specifying for 15,000 tons of an old contract.

The bar trade has been only moderately active, but consumers are receiving good shipments on the low priced contracts of October and November. It has developed that in that movement 1c. on bars was shaded.

The British coal strike has shown its first effect in this market in firmer prices for ferromanganese. English producers have had to bank their furnaces and shipments on contract are being curtailed.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics.

At date, one week, one month and one year previous.	Mar. 6, 1912:	Feb. 28, 1912.	Feb. 7, 1912.	Mar. 8, 1911.
Pig Iron, Per Gross Ton:				
Foundry No. 2 standard, Philadelphia	$14.85	$14.85	$14.85	$15.50
Foundry No. 2, Valley furnace	13.00	13.00	13.00	13.75
Foundry No. 2, Southern, Cincinnati	13.50	13.50	13.25	14.25
Foundry No. 2, Birmingham, Ala.	10.25	10.25	10.00	11.00
Foundry No. 2, at furnace, Chicago*	14.00	14.00	14.00	15.50
Basic, delivered, eastern Pa.	14.25	14.25	14.25	15.25
Basic, Valley furnace	**12.40**	12.25	12.25	13.75
Bessemer, Pittsburgh	14.90	14.90	14.90	15.90
Gray forge, Pittsburgh	13.40	13.40	13.40	14.40
Lake Superior charcoal, Chicago	15.75	15.75	16.00	17.50
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh	20.00	20.00	20.00	23.00
Open hearth billets, Pittsburgh	*19.50*	20.00	20.00	23.00
Forging billets, Pittsburgh	26.50	26.50	28.00	28.00
Open hearth billets, Philadelphia	22.40	22.40	22.40	25.40
Wire rods, Pittsburgh	25.00	25.00	25.00	29.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	15.00	15.00	15.00	15.50
Iron rails, Philadelphia	15.50	15.50	16.00	18.50
Car wheels, Chicago	13.00	13.00	13.00	13.25
Car wheels, Philadelphia	*11.75*	12.00	12.00	14.00
Heavy steel scrap, Pittsburgh	12.00	12.00	12.25	14.75
Heavy steel scrap, Chicago	10.50	10.50	10.50	12.00
Heavy steel scrap, Philadelphia	*11.50*	11.75	11.75	14.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel, Per Pound to Largest Buyers:	Mar. 6, 1912. Cents.	Feb. 28, 1912. Cents.	Feb. 7, 1912. Cents.	Mar. 8, 1911. Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.25	1.25	1.27½	1.37½
Iron bars, Pittsburgh	1.25	1.25	1.25	1.35
Iron bars, Chicago	1.15	1.15	1.15	1.27½
Steel bars, Pittsburgh	1.10	1.10	1.15	1.40
Steel bars, tidewater, New York	1.26	1.26	1.31	1.56
Tank plates, Pittsburgh	1.10	1.10	1.12½	1.40
Tank plates, tidewater, New York	1.26	1.26	1.28½	1.56
Beams, Pittsburgh	1.15	1.10	1.12½	1.40
Beams, tidewater, New York	1.31	1.26	1.28½	1.56
Angles, Pittsburgh	1.15	1.10	1.12½	1.40
Angles, tidewater, New York	1.31	1.26	1.28½	1.56
Skelp, grooved steel, Pittsburgh	1.10	1.10	1.12½	1.30
Skelp, sheared steel, Pittsburgh	1.15	1.15	1.20	1.35
Sheets, Nails and Wire, Per Pound to Largest Buyers:				
Sheets, black, No. 28, Pittsburgh	1.80	1.85	1.90	2.20
Wire nails, Pittsburgh	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh	1.55	1.55	1.55	1.60
Fence wire, ann'led, 0 to 9, P'gh.	1.40	1.40	1.40	1.55
Barb wire, galv, Pittsburgh	1.90	1.90	1.90	2.10
Coke, Connellsville, Per Net Ton, at Oven:				
Furnace coke, prompt shipment	$1.85	$1.80	$1.80	$1.55
Furnace coke, future delivery	1.85	1.80	1.80	1.75
Foundry coke, prompt shipment	2.25	2.25	2.00	2.00
Foundry coke, future delivery	2.25	2.25	2.10	2.25
Metals, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	14.62½	14.50	14.25	12.62½
Electrolytic copper, New York	14.50	14.37½	14.00	12.25
Spelter, St. Louis	6.82½	6.75	6.40	5.50
Spelter, New York	6.97½	6.90	6.55	5.65
Lead, St. Louis	3.92½	3.92½	3.90	4.25
Lead, New York	4.00	4.00	4.00	4.40
Tin, New York	43.25	43.37½	44.00	41.75
Antimony, Hallett, New York	7.37½	7.37½	7.50	9.25
Tin plate, 100-lb. box, New York	$3.54	$3.54	$3.64	$3.94

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific Coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter, 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates) 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, $1.40; galvanized, $1.70. Carload lots to retailers, annealed, $1.50; galvanized, $1.80. Galvanized barb wire to jobbers, $1.90; painted, $1.60. Wire nails, to jobbers, $1.60.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	1.85	1.90	1.95	2.00	2.10	2.20	2.60	2.70

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in., on one or both legs, ¼ in. and over, 1.15c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.	1.20 to 1.25
H-beams over 18 in.	1.20 to 1.25
Angles over 6 in.	1.20 to 1.25
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909	1.20 to 1.25
Tees, 3 in. and up	1.20 to 1.25
Zees, 3 in. and up	1.15 to 1.20
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909	1.20 to 1.25
Deck beams and bulb angles	1.45 to 1.50
Hand rail tees	2.00 to 2.15
Checkered and corrugated plates	2.00 to 2.15

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.20 to 1.25
Nos. 9 and 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.40 to 1.45
Nos. 15 and 16	1.50 to 1.55

Box Annealed Sheets, Cold Rolled.

	One Pass.	Three Pass.
Nos. 10 to 12	1.45 to 1.50	.....
Nos. 13 and 14	1.50 to 1.55	.....
Nos. 15 and 16	1.55 to 1.60	1.65 to 1.70
Nos 17 to 21	1.60 to 1.65	1.70 to 1.75
Nos. 22, 23 and 24	1.65 to 1.70	1.75 to 1.80
Nos. 25 and 26	1.70 to 1.75	1.80 to 1.85
No. 27	1.75 to 1.80	1.85 to 1.90
No. 28	1.80 to 1.85	1.90 to 1.95
No. 29	1.85 to 1.90	1.95 to 2.00
No. 30	1.95 to 2.00	2.05 to 2.10

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	1.80 to 1.85
Nos. 12, 13 and 14	1.90 to 1.95
Nos. 15, 16 and 17	2.05 to 2.10
Nos. 18 to 22	2.20 to 2.25
Nos. 23 and 24	2.30 to 2.35
Nos. 25 and 26	2.50 to 2.55
No. 27	2.65 to 2.70
No. 28	2.80 to 2.85
No. 29	2.90 to 2.95
No. 30	3.10 to 3.15

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations:

Corrugated Roofing Sheets Per Square.

Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29	....	$2.20	23	$2.25	$3.35
28	$1.30	2.45	22	2.40	3.50
27	1.40	2.50	21	2.60	3.85
26	1.50	2.55	20	2.85	4.15
25	1.70	2.90	18	3.80	5.40
24	1.95	3.00	16	4.55	6.25

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from December 1, 1911:

Butt Weld.

	Steel Black.	Steel Galv.	Iron Black.	Iron Galv.
⅛ and ¼ in.	74	54	68	49
⅜ in.	75	65	69	53
½ in.	78	68	72	59
¾ to 1½ in.	81	72	75	64
2 to 3 in.	82	75	76	65

Lap Weld.

1¼ and 1½ in.	..	..	68	61
2 in.	79	72	72	63
2½ to 4 in.	81	74	74	66
4½ to 6 in.	80	72	73	65
7 to 12 in.	78	68	71	61
13 to 15 in.	55	..	47	..

Butt Weld, extra strong, plain ends, card weight.

¼, ⅛, ⅜ in.	70	60	65	55
½ in.	75	69	70	63
⅝ to 1½ in.	79	73	74	65
2 to 3 in.	80	74	75	66

Lap Weld, extra strong, plain ends, card weight.

1½ in.	..	..	66	60
2 in.	76	70	71	63
2½ to 4 in.	78	72	73	66
4½ to 6 in.	77	71	72	65
7 to 8 in.	70	60	65	55
9 to 12 in.	65	55	60	50

Butt Weld, double extra strong, plain ends, card weight.

⅛ in.	65	59	60	52
¼ to 1¼ in.	68	62	63	55
2 to 3 in.	70	64	65	57

Lap Weld, double extra strong, plain ends, card weight.

2 in.	66	60	61	52
2½ to 4 in.	68	62	63	57
4½ to 6 in.	67	61	62	56
7 to 8 in.	60	50	55	45

Plugged and Reamed.

1 to 1½, 2 to 3 in. Butt Weld
2, 2½ to 4 in. Lap Weld

Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.		*Standard Charcoal Iron.*	
1¼ to 2¼ in.	65	1½ in.	48
2½ in.	67½	1¾ to 2¼	50
2¾ to 3¼ in.	72½	2½ in.	55
3½ to 4 in.	75	2¾ to 5 in.	60
5 to 6 in.	67½	Locomotive and steamship special grades bring higher prices.	
7 to 13 in.	65		

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discount, lowered by two points.

Pittsburgh

PITTSBURGH, PA., March 5, 1912.

The expected heavier buying movement, to come with the return of mild weather, has not yet developed. While several of the larger steel mills report that their specifications have slightly fallen off the leading local interest states that its specifications are very heavy, having been coming in so freely that it is holding plain structural material and plates at 1.15c. minimum, and is not booking any business below this figure. There is no doubt that the market on structural material is stronger, but on plates 1.10c. is still being done. The Jones & Laughlin Steel Company has started a second blast furnace at Aliquippa, making two out of four in operation, and three out of four of its Talbot open hearth furnaces are running. The feeling is still strong that with two or three weeks of mild weather there will be a heavy buying movement. There is no doubt that a good deal of tonnage is being held back on account of the extremely cold weather, and in addition to this shipments by the railroads have been very unsatisfactory for nearly two months, due to shortage in box cars and the trouble in moving freight on account of the extreme cold. Consumers still pursue the policy of buying only to cover actual needs, feeling secure in the belief that prices are not likely to be much higher in view of the large available capacity. The output of pig iron, steel billets and finished iron and steel in the Pittsburgh district is probably as heavy to-day as it has ever been, but the capacity has been largely increased, and it takes a great deal more tonnage in orders to keep the mills filled up. The coke market continues quite active, with prices firm for prompt shipment. Consumers of scrap are taking in a little more material, and the belief is that bottom has been reached in prices, with an upward turn likely if new demand shows an increase. The local situation, as a whole, looks a little brighter than last week.

Pig Iron.—The report is confirmed that the Pittsburgh Steel Company has bought upward of 10,000 tons of basic iron from a local interest for delivery in March. It is understood that a higher price was paid than for February iron and $12.40, at furnace, has been mentioned. Another local consumer has bought 500 to 1000 tons of basic at a price equal to about $12.50, at furnace. A sale is also reported of 1000 tons of Bessemer iron at $14.25, at furnace, for extended delivery, the seller guaranteeing the sulphur at not over 0.03, for which 25c. above the regular market was paid. There is a fair current demand for foundry iron, but no large lots are being sold. Prices on basic iron are firmer and the minimum of the market is $12.40, with most sellers asking $12.50, at furnace. We quote standard Bessemer iron at $14; malleable Bessemer, $12.75 to $13; basic, $12.40 to $12.50; No. 2 foundry, $13 to $13.25; gray forge, $12.50, all at Valley furnace, the freight rate to Pittsburgh being 90c. a ton.

Steel Billets.—The billet and rail sales department of the Carnegie Steel Company reports that its actual orders booked in February and sent to the mills for rolling showed an increase of 57,000 tons over January, a part of this large business being for export. The entrance of the Jones & Laughlin Steel Company into the market as a seller of billets and sheet bars is noteworthy. Consumers of billets and sheet bars are now figuring on their requirements for second quarter, and a good deal of tonnage is likely to be placed this week. Some sales of open hearth billets have been made on the basis of $19.50 or lower, Pittsburgh. We quote Bessemer billets, 4 x 4 in., $20; open hearth billets, $19.50 to $20; Bessemer and open hearth sheet and tin plate bars, $20 to $21, and forging billets, $28, all f.o.b., Pittsburgh. Bessemer and open hearth billets at Youngstown are ruling at about $19.50 and sheet bars $20 to $20.50, f.o.b. mill.

Ferromanganese.—Active inquiries are in the market for five to six carloads for prompt shipment, and prompt ferromanganese is hard to obtain. The price of English 80 per cent. ferromanganese is firm at $41, Baltimore, with a freight rate of $1.95 a ton for delivery in Pittsburgh district.

Ferrosilicon.—Prices are firm, but new inquiry is quiet, and only for small lots. We note sales of 50 tons, for prompt delivery, at the full price of $70, delivered. We quote 50 per cent. in lots up to 100 tons at $70; over 100 tons to 600 tons, $69, and over 600 tons, $68, Pittsburgh. The lower grades are ruling at about $20 for 10 per cent.; $21 for 11 per cent.; $22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio.

Muck Bar.—A sale of 200 tons of standard grade muck bar for March delivery is reported at $28, delivered at buyer's mill.

Wire Rods.—Nearly all consumers covered last December for their entire needs for the first half of this year, and specifications are coming in at a fair rate. New inquiry is light and only for small lots. We quote Bessemer, open-hearth and chain rods at $25, Pittsburgh.

Skelp.—The local market is quiet, but several mills that roll grooved and sheared skelp are in the market actively for business. We quote grooved steel skelp at 1.10c. to 1.12½c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.40c. to 1.45c. and sheared iron skelp, 1.55c. to 1.60c., all for delivery at buyer's mill in the Pittsburgh district.

Steel Rails.—The Carnegie Steel Company reports that it is now receiving liberal specifications against contracts for rails placed in January, and its three rail mills at Bessemer are now being operated to larger capacity than for some time, with considerable work ahead. No. 1 mill is rolling standard sections, No. 2 is rolling sheet bars and No. 3 mill is on light rails. This company is receiving some good orders for both standard sections and light rails for export. Both new demand and specifications for light rails are active, the same company booking about 3000 tons in the past week. There is also a liberal demand for splice bars. We quote splice bars at 1.50c. per lb., and repeat quotations on rails: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.25c.; 12 and 14-lb., 1.16c.; 16, 20 and 25-lb., 1.12c.; 30 and 35-lb., 1.10c., and 40 and 45-lb., 1.08c., f.o.b. at mill.

Structural Material.—While new inquiry has been light, two large local jobs are in the market, bids on which will be asked at an early date. One of these is the new Monongahela Hotel, contract for which has been awarded to the Thompson-Starrett Company, which will require about 8000 tons, and the other is the new building of the East End Savings and Trust Company, which will take about 6000 tons. A new bridge for the Pennsylvania Railroad at Columbus, Ohio, and a large steel building for the Fostoria Glass Company in West Virginia will also likely be placed this week. The American Bridge Company has taken 3400 tons of bridge work for the Great Northern and 2000 tons for a steel dock for the Seattle Construction & Dry Dock Company, Seattle, Wash., and 800 tons for the Northern Electric Railway in California. The Riverside Bridge Company has taken 1000 tons of steel for an addition to the Seelbach Hotel, Louisville, Ky. The McClintic-Marshall Construction Company, of this city, is the low bidder on 1000 tons of steel for the proposed new foundry at the Washington Navy Yard. The two local interests announce that their minimum price on plain material is 1.15c. and are reported as holding firm. We quote beams and channels up to 15

in. at 1.15c., f.o.b. Pittsburgh, but for a very desirable specification it is possible this price might be shaded.

Plates.—The Bessemer & Lake Erie Railroad has awarded 1000 all-steel gondola cars to the Pressed Steel Car Company, 500 steel gondolas and 400 underframe box cars to the Standard Steel Car Company and 100 all-steel box cars to the Summers Steel Car Company of this city. The latter is a new design of car, to be built by the Standard Steel Car Company at its shops at Butler, Pa. Bids have gone in on four large boats for the Pacific Mail Steamship Company which will take about 30,000 tons of plates and shapes, a good part of which will probably come to Pittsburgh. The plate mill of the Wheeling Steel & Iron Company at Benwood, W. Va., which has been idle for some time, started up March 4. Specifications on plates have been heavy and prices are a trifle firmer, the two leading local mills quoting 1.15c. on the usual run of orders, but on very desirable specifications one or two mills are still naming 1.10c. We quote ¼ in. and heavier plates at 1.10c. to 1.15c., f.o.b. Pittsburgh.

Sheets.—Several of the leading mills state that specifications against contracts for black and galvanized sheets in February were fully as heavy as in January, which was a record month. New demand continues only fair, as most consumers of sheets covered requirements last December for first half. They have been specifying liberally against their contracts. On the small amount of new business that is coming out, most mills are quoting 1.80c. for No. 28 black and 2.80c. for No. 28 galvanized. The American Sheet & Tin Plate Company and other leading sheet mills are operating at 85 to 90 per cent. of capacity.

Tin Plate.—The new demand is dull, but specifications against contracts are heavy, one leading maker reporting that its specifications in February were the heaviest in any one month in its history. Shipments of tin plate this month, providing there is an ample supply of cars, promise to break all previous records. We continue to quote tin plate at $3.25 to $3.40 per base box for 14 x 20 coke plates on the small orders that are coming out.

Iron and Steel Bars.—Leading makers report that the new demand for iron and steel bars is fair, while specifications against contracts are coming in freely. With the return of milder weather, permitting the resumption of outside building operations, a heavy demand for steel bars for concrete reinforcing purposes is expected. The general market on steel bars is 1.10c. and on common iron bars 1.25c. at mill, but on very desirable specifications 1.05c. is being done on steel bars.

Hoops and Bands.—New demand for hoops and bands is only for small lots, but specifications against contracts are coming in quite well. We continue to quote steel bands at 1.10c. with extras as per the steel bar card, and hoops at 1.25c., but on desirable orders these prices have been shaded about $1 per ton.

Rivets.—Makers report that specifications against contracts are coming in at only a fairly satisfactory rate, while the new demand is dull and only for small lots for current needs. We quote structural rivets at 1.45c. to 1.50c. and boiler rivets at 1.55c. to 1.60c., prices depending on the order.

Shafting.—Specifications against contracts from the automobile builders and the implement makers are showing some betterment, but new demand is light. Very low prices are ruling. We quote cold rolled shafting at 67 per cent. off in carload and larger lots and 62 per cent. in small lots, delivered in base territory.

Railroad Spikes.—Most of the railroads covered their requirements some time ago for a considerable period ahead and new buying is dull. We quote base sizes at $1.35 to $1.40 per 100 lb. in carload and larger lots.

Spelter.—Spelter is scarce and the market is higher. We quote prime grades of Western at 6.70c., East St. Louis, equal to 6.82½c., Pittsburgh.

Wire Products.—While the new demand for wire and wire nails is quiet, makers report that specifications against contracts are very active. Shipments in February were heavy and they promise to be fully as large this month. It is stated that regular prices are being held on the small amount of new business that is being placed. The shortage in supply of box cars is still interfering with shipments. We quote wire nails at $1.60; cut nails, $1.55; galvanized barb wire, $1.90; painted, $1.60; annealed fence wire, $1.40, and galvanized fence wire, $1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

Merchant Pipe.—Several rather large orders for line pipe are in the market. The Ohio Fuel Supply Company of this city is still figuring on the purchase of 75 miles of 12-in. and another local gas company has an inquiry out for about 65 miles of steel pipe in sizes ranging from 10 to 16 in. and for early delivery. The Kay County Gas Company, Ponca City, Okla., has bought 14 miles of 6 and 8-in. casing from the Oil Well Supply Company of this city. New demand for merchant pipe in January and February was much heavier than usual in those two months, and the call for oil country goods is increasing, partly due to the recent advance in prices of oil. The leading pipe mills are operating to about 75 per cent. of capacity.

Boiler Tubes.—New demand for locomotive and merchant tubes is quiet, but specifications against contracts for boiler tubes are coming in quite freely. Prices on merchant tubes are very low and several local makers have practically been out of the market for some time as sellers.

Iron and Steel Scrap.—Dealers report that a little more scrap is moving to consumers, and it is believed that prices are probably as low as they will go for the present. We note a sale of 500 tons of heavy steel scrap of selected grades at about $12.25, delivered. Prices are fairly strong. Dealers are quoting as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$12.00 to $12.50
No. 1 foundry cast	12.25 to 12.50
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mill, Pittsburgh district	10.75 to 11.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	9.00 to 9.25
Low phosphorus melting stock	15.00 to 15.25
Iron car axles	20.50 to 21.00
Steel car axles	16.00 to 16.25
Locomotive axle	22.00 to 22.50
No. 1 busheling scrap	11.00 to 11.25
No. 2 busheling scrap	7.00 to 7.25
Old car wheels	12.00 to 12.25
*Cast iron borings	9.00 to 9.25
*Machine shop turnings	9.50 to 9.75
†Sheet bar crop ends	13.75 to 14.00
Old iron rails	14.50 to 14.75
No. 1 wrought scrap	12.50 to 12.75
Heavy steel axle turnings	9.75 to 10.00
Stove plate	9.00 to 9.25

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—About 80 per cent. of the ovens in the Upper and Lower Connellsville regions are now in operation. The output last week was 391,253 net tons, a decrease over the previous week of about 2000 tons. Standard makes of furnace coke for prompt shipment continue scarce, and sales of 6000 to 8000 tons are reported at about $1.85 per net ton at oven. There is a fair demand for 72-hr. foundry coke for prompt shipment, and it brings from $2.25 to $2.50 at oven. We quote prompt furnace coke of standard grades at $1.80 to $1.85 and foundry $2.15 to $2.25, per net ton at oven. Standard furnace coke on contracts is held at $1.75 to $1.85 and 72-hr. foundry at $2.25 to $2.40, per net ton at oven.

Chicago

CHICAGO, ILL., March 5, 1912.

The last week of February brought out a decided increase in mill specifications as compared with the first two weeks in the month and developed a tonnage for the month sustaining the record of the previous similar period. All of the local mills of the Steel Corporation, including the rail mills at South Chicago and Gary, which were started up February 26, are now in full operation and the blast furnace and open-hearth capacity is being pushed to its maximum. The mills at Indiana Harbor are likewise well filled for a number of weeks to come. Accumulated rail tonnage has now reached no inconsiderable proportions, and the pending purchases by three Western trunk lines have decidedly bettered the aspect of the rail situation in this district. Prices on all finished steel products seem neither better nor worse, although concessions are, perhaps, within narrower limits than they have been. The most prompt deliveries particularly on plates and structural shapes are now obtainable from Eastern mills, notwithstanding which such price weaknesses as exist emanate very largely from those sources. The past week also brought out a better volume of new orders. Inquiry for pig iron aggregated an interesting

total, but a comparatively small proportion has developed thus far into orders. The scrap market is decidedly quiet, as a result of the lack of melting demand and the small quantity of old material that the severe weather has permitted bringing in.

Pig Iron.—The past 10 days have witnessed inquiry in this market for a round tonnage of pig iron, a large part of it for Southern iron. One lot of 2000 tons is noted and several others of 1500 tons and less. The majority of this business has not yet been placed. Southern iron is pretty generally upon the basis of $10.50 for No. 2 at Birmingham but at this price is excluded from competition with local iron in Chicago proper. Northern iron continues to move on the basis of $14 at the furnace with no features of unusual interest developing. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal	$15.75 to $16.50
Northern coke foundry, No. 1	14.50
Northern coke foundry, No. 2	14.00
Northern coke foundry, No. 3	13.50 to 14.00
Northern Scotch, No. 1	16.00
Southern coke, No. 1 foundry and No. 1 soft	15.35
Southern coke, No. 2 foundry and No. 2 soft	14.85
Southern coke, No. 3	14.35
Southern coke, No. 4	14.10
Southern gray forge	13.85
Southern mottled	13.85
Malleable Bessemer	14.00
Standard Bessemer	16.75
Basic	14.75
Jackson County and Kentucky silvery, 6 per cent	16.40
Jackson County and Kentucky silvery, 8 per cent	17.40
Jackson County and Kentucky silvery, 10 per cent	18.40

Rails and Track Supplies.—The rail mills at both the South Chicago and Gary works of the Illinois Steel Company were placed in operation the first of last week. This is taken to indicate not only a considerable accumulation of orders but a prospect that the tonnages upon which the Rock Island, the Atchison, and the St. Paul have been figuring will soon be on the mill books. We quote standard railroad spikes at 1.50c., base; track bolts, with square nuts, 1.90c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c., Chicago.

Structural Material.—Local fabricators have been subsisting on a decidedly lean fare for some time, and the prices at which contracts for fabricated material are taken indicate that the successful bidder expects little profit from the work secured. Contracts aggregating 8500 tons were closed the past week, including 1000 tons for the Goddard Building, Chicago, awarded to the Noelke-Richards Iron Works; 3400 tons for the Great Northern Railway Company, awarded to the American Bridge Company, which also will fabricate 2000 tons for a dry dock for the Seattle Construction & Dry Dock Company; 780 tons for girder spans for the Northern Electric Railway Company, California, to the American Bridge Company; 269 tons for the Northwestern Telephone Exchange Building at Duluth, to A. Bolter's Sons; 276 tons for the Great Lakes Dredge & Dock Company to the Kenwood Bridge Company; 701 tons for the Flood Building, San Francisco, to Dyer Bros.; 102 tons for municipal building, San Francisco, to the Judson Mfg. Company. Plans are completed in the offices of D. H. Burnham & Co. for the new warehouse building of Butler Bros., to be erected at a cost of $1,500,000. Structural specifications continue to be received by the mills in steady volume. The principal car order placed was for 1000 box cars, 25 passenger cars and 50 tank cars for the Northern Pacific, the award being made to the American Car & Foundry Company. For plain material we quote, mill shipment, Chicago delivery, 1.25c. to 1.35c. and from store, 1.60c.

Plates.—Local mills are finding it difficult to satisfy delivery requirements of many of their customers and a considerable volume of business that would otherwise be placed here is being diverted to Pittsburgh. Where such mills are able to ship promptly, it is possible to obtain the maximum price, even on desirable business. The Republic Iron & Steel Company is entering the local market as a maker of plates and is able to furnish widths up to 84 in. For mill shipment, Chicago delivery, we continue to quote 1.25c. to 1.35c., and from store, 1.60c.

Sheets.—Irregular prices continue to prevail, and the well sustained tonnage of sheets being placed with the mills remedies very slowly the unsatisfactory situation. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.35c.

Bars.—At East Chicago the mills of the Interstate Iron & Steel Company and the Republic Iron & Steel Company are rolling bar iron upon heavier schedules than had been possible for many months. A more general firmness in prices upon the basis of 1.15c. is also apparent. With regard to steel bars no new conditions seem to have arisen. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.25c. to 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars, rolled from old rails, 1.15c. to 1.20c. From store: Soft steel bars, 1.50c. to 1.55c., Chicago.

Wire Products.—In the continued cold weather and a pronounced shortage of cars wire makers are encountering two serious handicaps on the movement of tonnage. A sudden breaking up of winter will doubtless be followed by a heavy rush of orders that will, temporarily at least, make the car situation more pronouncedly bad. We continue to quote as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78 to $1.83; galvanized, $2.08; polished staples, $1.83; galvanized, $2.13, all Chicago.

Cast Iron Pipe.—The past week brought out no important lettings of cast iron pipe aside from 3000 tons for the city of St. Louis, which was awarded to the Detroit shop of the American Car & Foundry Company. At Dayton, Ohio, James B. Clow & Son took an order for a few hundred tons. We quote as follows, per net ton, Chicago: Water pipe, 4-in., $27; 6 to 12-in., $25; 16-in. and up, $24.50, with $1 extra for gas pipe.

Old Material.—Owing to the almost complete restriction placed upon the gathering of scrap, as a result of the protracted winter, very little old material is being offered. When this accumulated material is released the market will be called upon to absorb a heavy tonnage. A large portion of this is already under order from the melters who, because of their inability to have material moved into them, have been compelled to buy more widely and largely than would have been necessary otherwise. Trading is very light and where possible consumers are making exchange deals for their scrap rather than purchasing in the open market, even at prices somewhat more favorable. It is understood that the major portion of the recent Burlington list was disposed of in this manner. New lists of scrap offered include 2300 tons by the Illinois Central, of which 500 tons are rerolling rails; 1000 tons by the Michigan Central, and 250 tons by the Chicago & Alton. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$15.00 to $15.50
Old steel rails, rerolling	12.50 to 13.00
Old steel rails, less than 3 ft.	11.75 to 12.25
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.00 to 10.50
Steel axle turnings	8.50 to 9.00

Per Net Ton.

Iron angles and splice bars	$12.50 to $13.00
Iron arch bars and transoms	13.50 to 14.00
Steel angle bars	10.00 to 10.50
Iron car axles	17.75 to 18.25
Steel car axles	15.50 to 16.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	10.00 to 10.50
Steel springs	10.50 to 11.00
Locomotive tires, smooth	12.75 to 13.25
Machine shop turnings	6.50 to 7.00
Cast and mixed borings	6.25 to 6.75
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.25 to 6.75
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	11.00 to 11.50
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.00 to 9.50
Pipes and flues	8.00 to 8.50

Sheffield Coal & Iron Company.—Holders of stock and bonds of the Sheffield Coal & Iron Company, which has blast furnaces at Sheffield, Ala., have been asked to deposit their holdings with the Bankers' Trust Company, New York, preliminary to a reorganization. James Gayley is chairman of the committee which has the affairs of the company in charge. The bonded debt is $750,000, interest on which the company is unable to pay. The capital stock is $3,250,000.

Philadelphia

PHILADELPHIA, PA., March 5, 1912.

February showed no important buying movement in this district and new orders so far this month have come out rather hesitatingly. Some little disposition is shown to cover advance requirements in view of possible interruptions by a coal strike. Coke has been the most active, and considerable buying for prompt shipment is noted. The pig iron market drags, although a slightly better inquiry is apparent in some directions. The movement is confined to the foundry grades. A moderate business is moving in plates and shapes. In bars the demand is light. The old material market is inclined toward easiness, due to the lack of interest shown by consumers.

Iron Ore.—The market is practically at a standstill. Importations included 5700 tons from Cuba and 750 tons from Venezuela. This latter cargo represents the initial shipment of Imataca ore by the Canadian Venezuelan Ore Company, Montreal, Canada. Another small cargo of this ore is due to arrive in about six weeks, although regular shipments will not follow until midsummer.

Pig Iron.—While there has been a trifle more inquiry for the higher grades of foundry iron, the demand is confined to small, prompt lots, and in few instances do the quantities asked for exceed 200 tons. Few sellers report aggregate sales as much as 1000 tons. Producers take encouragement in the fact that deliveries continue to be freely taken. Small sales of special analysis irons are reported and one lot of 500 tons of Bessemer iron, for foundry purposes, is noted. Inquiries are out for several small lots of malleable pig iron, but no sales are reported. Odd lots of car wheel iron have been sold. In Virginia foundry grades several fair sales for New England delivery are reported. Cast iron pipe makers show somewhat more interest in the market. The Delaware River interest inquiring for 5000 tons, May-June delivery, has about closed for 1000 tons of Southern No. 4 foundry and several thousand tons of Northern low grade. Others are sounding the market, but prices asked are usually above what they are willing to pay. No fresh demand for rolling mill forge iron is noted. Eastern consumers of basic iron show little interest in the market, although sellers have an inquiry for 5000 tons for export, which cannot be considered as far as producers in this district are concerned. Small sales of standard low phosphorus iron are reported at prices ranging from $19 to $19.25, delivered. The inquiry for a round block, from a local consumer, previously reported, is still unclosed. While general quotations show a rather wide range, small lot sales at the top of the market are still being made, particularly in the foundry grades, although the bulk of the sales are closer to the inside figure. For delivery in buyers' yards in this district the following quotations are named:

Eastern Pennsylvania No. 2 X foundry	$14.85 to $15.25
Eastern Pennsylvania No. 2 plain	14.60 to 15.00
Virginia foundry	15.00 to 15.50
Gray forge	14.25
Basic	14.25 to 14.50
Standard low phosphorus	19.00 to 19.25

Ferroalloys.—The situation as far as ferromanganese is concerned is rapidly becoming more complex. The coal strike abroad has resulted in the curtailment of production and prices are extremely firm at $41, Baltimore, while several sellers have withdrawn from the market. Several inquiries before the trade are still unclosed. Small lots of 50 per cent. ferrosilicon have been made at $70, delivered. Some irregularity is noted in the price of furnace silicon, the 10 to 12 per cent. grades of which are nominally quoted at $24.30 to $26.30, delivered here.

Billets.—Little real activity is noted in the demand, but specifications come out freely. Inquiry for any important quantities of either rolling or forging billets are few. Prices remain unchanged, basic open-hearth rolling billets, for early shipment, commanding $22.40 to $23.40, and ordinary forging billets, $26.40 to $27.40, delivered in this district.

Plates.—Business continues of an irregular nature. Mills which can make good deliveries are obtaining a fair proportion of orders, while specifications have, in instances, been heavier. There is still some variation in prices, certain producers refusing to shade 1.30c., delivered, for the general run of business, although others will accept 1.25c. if the order is attractive.

Structural Material.—Several moderate propositions are on the point of closing, and some small business has been taken by fabricators. A moderate demand for plain shapes is reported, but mills make few gains and continue to operate at about 60 per cent. of full capacity. Prices show little change, 1.25c. to 1.30c., delivered here, being named for plain shapes, dependent on specifications.

Sheets.—Orders have been coming to Eastern mills more freely, and books are reported in better shape than any time since the first of the year. Mills are operating at full capacity and find it difficult to keep up with the demand. As a rule prompt delivery requests accompany a majority of the orders received. Western sheets have been fairly active at 2 to 2.05c., delivered here, while Eastern mills making smooth, loose rolled sheets obtain ¼c. to ½c. advance over the outside price.

Bars.—There has been little if any improvement in the general demand for iron or steel bars. Business is closely confined to small prompt lots, and mills are showing more anxiety for orders. Round lots of desirable specifications would no doubt result in concessions, particularly in common iron bars. For the ordinary run of business iron bars are quoted at 1.25c. to 1.32½c., with steel bars at 1.25c. to 1.30c., delivered in this vicinity.

Coke.—Marked activity in foundry coke is noted. Consumers are endeavoring to get a supply on hand to tide them over any labor difficulties between mine owners and their employees, and as delivery must be prompt producers have taken advantage of the situation to force prices to a higher level. Producers are not particularly anxious to contract, but sell for March shipment at prices ranging fom $2.25 to $2.50, at oven. Several moderate sized contracts for March furnace coke have been closed at prices ranging from $1.75 to $1.85, at oven, according to brand. For delivery in this district the following range of prices per net ton is named:

Connellsville furnace coke	$4.00 to $4.15
Foundry coke	4.50 to 4.75
Mountain furnace coke	3.70 to 3.85
Foundry coke	4.10 to 4.35

Old Material.—A slightly better small lot movement in some grades is noted, but the market lacks strength. Old orders at high prices, which were unfilled on March 1, were largely canceled by consumers, and in several instances merchants now refuse to pay within 50c. of what was offered last week, particularly for heavy melting steel, one 1000-ton lot of which was sold at $11.50, while another 1000-ton lot of strictly high grade railroad steel was closed at $12, delivered. The railroad lists now out show a fairly large amount of old material, offering prices for which are not expected to be as high as last month. Borings on a slightly better demand are somewhat firmer. The following range of prices about represents quotations at which ordinary current business for prompt shipment can be done for delivery in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate from Philadelphia varying from 35c. to $1.35 per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap and crops	$11.50 to $12.00
Old steel rails, rerolling (nominal)	13.50 to 14.00
Low phosphorus heavy melting steel scrap	15.50 to 16.00
Old steel axles	17.00 to 17.50
Old iron axles (nominal)	22.00 to 23.00
Old iron rails (nominal)	15.50 to 16.00
Old car wheels	11.75 to 12.25
No. 1 railroad wrought	14.00 to 14.50
Wrought iron pipe	11.50 to 12.00
No. 1 forge fire	9.75 to 10.25
No. 2 light iron (nominal)	6.75 to 7.25
Wrought turnings	8.50 to 9.00
Cast borings	8.25 to 8.50
Machinery cast	12.75 to 13.25
Railroad malleable (nominal)	11.75 to 12.25
Grate bars, railroad	10.00 to 10.50
Stove plate	9.50 to 10.00

J. K. Dimmick & Co., Land Title Building, Philadelphia, Pa., have been appointed sole sales agents for the pig iron manufactured by the Emporium Iron Company, Emporium, Pa. This is a high-grade foundry iron, well-known throughout eastern Pennsylvania, New York and New England. The capacity of the Emporium furnace is between 200 and 300 tons daily.

New York State Steel Company Resumes.—At a meeting of the directors of the New York State Steel Company, Buffalo, N. Y., held February 16, F. Ernest Porter was elected president and George H. Siccard secretary and treasurer. Arrangements were made to resume operations, and the company's blast furnace, on the Buffalo River and the Delaware, Lackawanna & Western Railroad and Elk street, will be blown in about April 1.

Cleveland

CLEVELAND, OHIO, March 5, 1912.

Iron Ore.—A representative of a Lake Superior ore interest who has visited a number of Eastern furnace companies in the past few weeks did not bring back very encouraging reports as to the prospects of making sales there this season unless prices are made that are much lower than sellers will now consider. Eastern buyers, it is stated, would contract for Mesaba non-Bessemer at 8c. a unit delivered, which is equivalent to about $2.67, Lake Erie port. While a scarcity of foreign ores is still reported, Eastern buyers appear to be planning to get their supplies from foreign sources and look for a reduction in the near future of the ocean freight rates which at present are very high. A local ore firm is still dickering with one of the Eastern furnace companies which recently inquired for prices on Lake Superior ore. No ore inquiries from the Central West are coming up and there are no developments in the price situation. Some low grade ore has been sold recently at last year's prices. The prices on these ores a year ago were very low. Ore men are adhering to the prediction made some time ago that shipments this year will reach 40,000,000 tons. It is expected that the increase over last year will be largely due to heavier shipments by the steel companies, both the Steel Corporation and the independents. We quote prices as follows: Old range Bessemer, $4.50; Mesaba Bessemer, $4.25; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Pig Iron.—There is an improvement in the demand for Southern grades and inquiries are now pending for several lots. We note the sale of one 500-ton lot of No. 2 Southern for second quarter delivery at $10.50, Birmingham, at which price the market seems to be fairly well established. Some sales of Northern foundry ranging from carload lots to 300 tons are reported, but there are no inquiries for round lots. Shipments on contracts are good, consumers generally wanting all the iron they have contracted for. Some orders are being placed by consumers who find that they will need more iron than they have purchased for their first half requirements. A fair volume of business is expected to result from these additional requirements in the next few weeks. Foundry iron in the Valley is fairly well maintained at $13.25 at furnace. Local prices are firm and unchanged. We quote the following prices for prompt shipment for the second quarter, delivered Cleveland:

Bessemer	$14.90
Basic	13.25
Northern foundry No. 2	13.25
Southern foundry No. 2	$14.60 to 14.85
Gray forge	12.50
Jackson County silvery, 8 per cent. silicon	17.05

Coke.—There is a fair demand for foundry grades in carload lots for spot shipment. The scarcity recently noted continues. Some sellers are taking orders without making promises as to delivery. Prices are firm. We quote standard Connellsville furnace coke at $1.85 to $2 for prompt shipment and contract. Connellsville foundry coke is held at $2.25 to $2.50 for prompt shipment and $2.25 to $2.40 for contract.

Finished Iron and Steel.—The demand has improved somewhat and the outlook is regarded as more encouraging. The cold weather that has prevented the starting of outside construction work has continued until the present time, but with spring close at hand builders are preparing for a busy season and fabricators are already getting a better volume of inquiries. The feeling is general that a change in the weather will result in a more active demand in all steel lines. Some of the selling agencies report an improvement in current orders for small lots. New inquiries are more plentiful, these being mostly for structural material. The price situation also shows an improvement. While the recent low prices have not disappeared, some of the independent mills are joining the efforts made by the leading interest in maintaining the prices that prevailed before the recent slump. Sales of structural material were made during the week at 1.10c., Pittsburgh, and while a round tonnage may still be bought at this price the 1.15c. quotation is being more generally maintained. Plates are firmer. Some of the mills that have been selling at 1.10c., Pittsburgh, are now holding to 1.15c. Steel bars are quoted at 1.10c. to 1.15c., Pittsburgh. In structural lines the Burger Iron Company, Akron, Ohio, has taken 1500 tons for additions to be built to the plant of the Diamond Rubber Company, Akron. Government work at Sault Ste. Marie, for which bids will be received March 12 and on which local companies are figuring, will require 500 tons of structural material. Two or three other new inquiries are out for lots of about 500 tons. The sheet situation is still unsatisfactory in the volume of business and prices. The general market price is 1.80c. for No. 28 black and 2.80c. for No. 28 galvanized in carload lots, but mills are getting $2 a ton more for less than carload lots. The demand for iron bars is light, with the price unchanged at 1.20c., Cleveland mill.

Old Material.—The market shows no life. Mills are still well supplied with scrap and it appears that low prices are not tempting them to buy. The demand on contract is light and three local mills are holding back on shipments. Dealers are still asking about the same prices that prevailed a few weeks ago, but the market is weak. The Lake Shore Railroad, which has not offered scrap for some time, has a large list out which will close March 9. Dealers' prices, f.o.b. Cleveland, are as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.25 to $12.75
Old iron rails	14.00 to 14.50
Steel car axles	17.50 to 18.00
Heavy melting steel	11.00 to 11.50
Old car wheels	12.00 to 12.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	10.50 to 11.00
Railroad malleable	11.50 to 12.00
Light bundled sheet scrap	9.50 to 10.00

Per Net Ton.

Iron car axles	$18.50 to $19.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	6.75 to 7.00
Steel axle turnings	7.25 to 7.75
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.00 to 11.25
No. 1 cast	11.25 to 11.75
Stove plate	9.00 to 9.25
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, March 6, 1912. (*By Telegraph*).

Pig Iron.—If any change at all can be reported, it probably would tend toward quieter conditions. Buyers and sellers appear to be unable to get together for third and fourth quarter business, and contracts now consummated cover only requirements for nearby shipment. Both furnace and foundry yard stocks are being gradually reduced, according to reports from different districts and Southern furnaces are taking advantage of the situation to hold out for higher prices. Although there has been considerable No. 2 foundry iron sold for first-half delivery above $10, Birmingham, it is possible to obtain for prompt movement a limited tonnage of the same grade as low as that figure at furnace, but it is generally understood that the Alabama producers are holding out for $10.50 for any delivery until July 1. Northern iron is dull, and it is rumored that a few interests would take on third quarter business at $13.25, Ironton, and if the contract was sufficiently attractive, this figure could be inserted for deliveries to be extended through the last half. First half prices remain at $13 at furnace. From central Ohio is an inquiry for 500 to 1000 tons of No. 2 foundry, to be delivered during the next six months. Other inquiries before the trade are for smaller lots, mainly for prompt shipment. A 400-ton sale of Southern No. 1 soft in Illinois territory was made at $10.50 for March-April shipment, but this does not represent the market, as the furnace in question was long on this particular brand. Malleable is quiet and there are no calls for charcoal. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

Southern coke, No. 1 foundry and 1 soft	$13.75 to $14.25
Southern coke, No. 2 foundry and 2 soft	13.25 to 13.75
Southern coke, No. 3 foundry	12.75 to 13.25
Southern coke, No. 4 foundry	12.50 to 13.00
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon	16.45 to 16.95
Lake Superior coke, No. 1	14.70 to 14.95
Lake Superior coke, No. 2	14.20 to 14.45
Lake Superior coke, No. 3	13.70 to 13.95
Basic, Northern	14.20 to 14.45
Standard Southern car wheel	25.25 to 25.50
Lake Superior car wheel	19.00

(By Mail.)

Coke.—Prices continue very firm in all three districts. Many complaints are being registered over delays in getting out shipments. In the Connellsville and Wise County fields rolling stock is hard to obtain, and after a car is loaded it is frequently held up enroute. Labor conditions are also responsible for considerable trouble, and producers are disposed to make the consumer bear at least part of the burden, and are asking higher prices than have been obtained for a

long time previous. Connellsville foundry grades are bringing all the way from $2.25 to $2.40 per net ton at oven, although Wise County brands are obtainable at about 10c. a ton lower, while in the Pocahontas district as low as $2 has been done on some prompt shipment 72-hr. coke, with $2.10 to $2.15 about representing what sellers are asking on future contracts. Furnace coke averages about $1.75 to $1.90 in all three fields. A local selling agency reports the sale of 150 cars of foundry coke to be delivered during the next six months.

Finished Material.—Very little has developed to change conditions as existing last week. It is generally understood that a desirable order for steel bars would not be turned down on an offer of 1.10c., Pittsburgh basis, but the regular quotable figure in this market remains at 1.15c. Structural material is very slow and 1.15c. to 1.20c. at mill are the quotations that are being made on business offering. The local warehouse prices are unchanged; steel bars are being sold around 1.60c. and structural material, cut to lengths, at about 1.70c. The local manufacturer of sheets has withdrawn all quotations on account of the sharp advance in spelter. A new card has been issued showing advances of from $1 to $2 a ton.

Old Material.—The local market is not only very dull, as previous reports indicated, but prices are soft, and there are no indications of any immediate improvement. Railroad offerings are light and sellers of scrap material are slow in accepting offers that dealers are willing to make. The minimum figures given below represent what buyers are willing to pay for delivery in their yards in southern Ohio and Cincinnati, and the maximum quotations the selling price, f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	$6.75 to	$7.25
Old iron rails	12.25 to	12.75
Relaying rails, 50 lb. and up	20.00 to	21.00
Rerolling steel rails	11.00 to	11.50
Melting steel rails	8.75 to	9.25
Heavy melting steel scrap	8.75 to	9.25
Old car wheels	10.75 to	11.25

Per Net Ton.

No. 1 railroad wrought	$9.50 to	$10.00
Cast borings	5.25 to	5.75
Steel turnings	5.50 to	6.00
No. 1 cast scrap	9.75 to	10.25
Burnt scrap	6.25 to	6.75
Old iron axles	15.75 to	16.25
Locomotive tires (smooth inside)	11.25 to	11.75
Pipes and flues	6.75 to	7.25
Malleable scrap	7.25 to	7.75

Birmingham

BIRMINGHAM, ALA., March 5, 1912.

Pig Iron.—There have been several small sales made on the new established basis of $10.50, Birmingham, for No. 2, but these sales have all been pretty well confined to Southern territory. One Southern interest bought 1000 tons of No. 2 soft at this figure. A nice lot of basic was sold here recently, but it brought $10 at the furnace. Low grades of pig iron are very scarce, and it is practically impossible to obtain any No. 3 or No. 4 foundry or gray forge for nearby shipment. There has been no material change recently in the rate of production. It is reported that one of the largest buyers in the country is feeling out the different markets for 25,000 to 50,000 tons for shipment over the second quarter; but producers are loth to admit that such inquiry is pending. The market continues to be quotable for delivery during the remainder of the first half, as follows, per gross ton, f.o.b. furnaces, Birmingham district:

No. 1 foundry and No. 1 soft	$10.75 to	$11.00
No. 2 foundry and No. 2 soft	10.25 to	10.50
No. 3 foundry	9.75 to	10.00
No. 4 foundry	9.50 to	9.75
Gray forge	9.25 to	9.50
Standard basic	10.25 to	10.50
Off basic	9.75 to	10.00

Cast Iron Pipe.—Business continues good with manufacturers of cast iron water pipe, and prices are reported a little more satisfactory than the figures on which most shipments were made in the last few months. There has been no increase in the rate of production, though the North Birmingham plant, which has been idle for some months, is being gotten in shape rapidly for operating, and one entirely new foundry, which is to operate on cast iron water pipe, is being constructed. The principal inquiries have been from smaller municipalities, on which quotations have been about as follows per net ton, f.o.b. foundries Birmingham district: 4 to 6-in., $23; 8 to 12-in., $22; over 12-in., average, $21, with gas pipe taking the usual differential of $1 per ton more.

Old Material.—The ruling prices in the scrap iron market seem to change but little. There remains a fair stock in the hands of consumers, but there is no disposition to add to this stock unless at a material concession in price, and it seems that the ultimate consumer of scrap is not inclined to bid any higher than has been the case for some months. The result is that the traffic in this class of material is rather limited and quotations continue to remain nominally as follows per gross ton, f.o.b. dealers' yards:

Old iron axles (light)	$12.50 to	$13.00
Old steel axles (light)	11.50 to	12.00
Old iron rails	11.50 to	12.00
No. 1 railroad wrought	10.50 to	11.00
No. 2 railroad wrought	9.00 to	9.50
No. 1 country wrought	6.00 to	6.50
No. 2 country wrought	5.50 to	6.00
No. 1 machinery	8.50 to	9.00
No. 1 steel	8.00 to	8.50
Tram car wheels	7.50 to	8.00
Standard car wheels	9.50 to	10.00
Light cast and stove plate	6.00 to	6.50

St. Louis

ST. LOUIS, MO., March 4, 1912.

The market shows an improved tone but without specially notable increases in new business. Orders and inquiries suggest that consumers are close to a buying movement and this fact is keeping prices pretty well in line. Except in isolated spots, collections continue good, showing that material is being used and paid for.

Pig Iron.—The demand is chiefly for small lots to round out special requirements, with some few orders as additions to previous contracts, and the total runs into fair figures. Takings on specifications are well maintained. Most of the sales of the week have been for carloads and 100-ton lots. One house reports a sale of 4000 tons of Northern, but withholds details. The inquiry of chief interest in the market to-day is for 500 tons of Lake Superior charcoal car wheel iron. Prices remain at $10.50, Birmingham, for No. 2 Southern and $13, Ironton, for No. 2 Northern.

Coke.—Between the difficulty in getting cars for shipments and the heavy shipment from the ovens on specifications, coke has been stiffening in price. By-product coke is also strong at and above $5.25 delivered.

Old Material.—While there has been nothing of moment actually doing in the scrap market the past week, mills have been inclined to come into the market for special lots, showing that their supplies are not filled up all along the line. Dealers regard this as indicating that there will be a more active inquiry for larger lots in a short time. The lists coming out during the past week included 2600 tons from the Missouri Pacific, 750 tons from the Chicago & Eastern Illinois, 600 tons from the Wabash and 600 tons from the Kansas City Southern. These close later in the week, but there is a feeling that even this quantity will not materially crowd the prices down. We quote, f.o.b. St. Louis, as follows:

Per Gross Ton.

Old iron rails	$14.00 to	$14.50
Old steel rails, re-rolling	11.00 to	11.50
Old steel rails, less than 3 ft.	10.50 to	11.00
Relaying rails, standard section, subject to inspection	21.50 to	22.00
Old car wheels	12.00 to	12.50
Heavy melting steel scrap	10.00 to	10.50
Frogs, switches and guards cut apart	10.00 to	10.50

Per Net Ton.

Iron fish plates	$12.50 to	$13.00
Iron car axles	17.50 to	18.00
Steel car axles	15.00 to	15.50
No. 1 railroad wrought	11.00 to	11.50
No. 2 railroad wrought	10.00 to	10.50
Railway springs	9.25 to	9.75
Locomotive tires, smooth	11.00 to	11.50
No. 1 dealers' forge	8.00 to	8.50
Mixed borings	5.50 to	6.00
No. 1 busheling	8.50 to	9.00
No. 1 boilers, cut to sheets and rings	8.00 to	8.50
No. 1 cast scrap	8.50 to	9.00
Stove plate and light cast scrap	8.00 to	8.50
Railroad malleable	8.50 to	9.00
Agricultural malleable	7.50 to	8.00
Pipes and flues	7.50 to	8.00
Railroad sheet and tank scrap	7.00 to	7.50
Railroad grate bars	7.00 to	7.50
Machine shop turnings	6.50 to	7.00

Finished Iron and Steel.—Structural material is showing increased activity as a result of the growing tendencies in the building trade. The total tonnage moving is regarded as especially good and the price is well held at 1.15c., Pittsburgh. In plates the movement on new business is slight. In bars the specifications on contracts are liberal and the demand for reinforcing bars continues to show increase. In rails,

standard section, the chief item of the week was the order of the Missouri Pacific for about 12,000 tons. Inquiries in the market for small lots will total about 2000 tons. A Texas road has placed an order for about 6000 tons which will be furnished by the Pennsylvania Steel Company. In light rails the business of the lumber companies, together with some few orders from the coal interests, is making quite a tonnage, with the result that the past week was satisfactorily active. Track fastenings are in increasingly good demand.

San Francisco

SAN FRANCISCO, CAL., February 27, 1912.

Scarcely any rain has fallen in California in February, and the general crop outlook is the worst in several years. This condition has caused great apprehension, and within the last week has resulted in a material curtailment of jobbing trade in some lines of steel products. Partly on this account, and partly owing to the apparent weakness of primary markets, orders for second-quarter delivery are extremely light. Specifications on contracts placed at the close of the year, however, are fully up to normal, indicating a fairly strong consuming demand. Prices in the jobbing market have recovered from the recent depression, advances being noted in several departments.

Bars.—A substantial increase in the tonnage of reinforcing bars has brought a firmer feeling in prices, though so far no quotable advance is noted. The movement is almost entirely in small lots, though a few large inquiries are in prospect, and continued activity is expected. Specifications on contracts for merchant bars are coming out in good shape, but there is little doing in the way of new business, as the small distributive trade is less active than last month and merchants find it unnecessary and undesiraable to carry as large stocks as in former years. Resale prices have advanced sharply, standing higher than at the close of the year. Soft steel bars, from store, San Francisco, are quoted at 2.10c., and iron at 2c.

Structural Material.—Several good-sized contracts have been closed this week, while more large jobs are being figured than for some time past. Dyer Bros. will fabricate about 500 tons for the Flood residence, this city, and 750 tons for the Alameda Sugar Company's mill at Meridian, Cal., and a 400-ton contract on the Rowell building, Fresno, Cal., has been awarded to the McClintic-Marshall Construction Company. The Fort Mason pumping station job has been let to a local concern. A 200-ton job for the Acme Cement Plaster Company, Gypsum, Wash., is up for figures. Within the next three weeks plans will be out for the Geary street car barns, the White Investment Company building, and the Crocker Estate office building, this city. The Globe Grain & Milling Company is planning to erect four grain elevators at Los Angeles. The cities of Los Angeles and Pasadena, Cal., are considering the erection of a steel bridge at an estimated cost of $200,000. A large tonnage of structural steel was shipped recently from Tacoma, Wash., to Japan.

Rails.—The tonnage coming out at San Francisco this month is rather light, as several of the larger buyers are inclined to hold off a little longer, and a number of projects in preparation are not yet ready for business. A good many small orders for light rails are coming out from logging firms, however, and the tonnage in this line is much heavier in the north coast than in California. Many new inquiries are also coming from street and interurban roads in Oregon and Washington. Contracts are expected within a month for 63 miles of track for the Oregon & Southern Railway, connecting Ashland, Roseburg and Marshfield, Ore.

Sheets.—While orders for forward delivery are rather slow in appearing, the market is in fairly good condition, specifications being rather above expectations. The small trade is moderately active, but the leading demand at present is from manufacturers of riveted pipe, who have work on hand and in prospect requiring a heavy tonnage. This business is steadily increasing with the development of new irrigation projects. Galvanized sheets, which have been sold at extremely low prices by merchants for several months, have been advanced 15c. per 100 lb.

Plates.—Tank plates are moving a little better in a small way, but large individual inquiries are scarce, and merchants are not inclined to buy much ahead of their requirements. Local resale prices are a little higher on tank and flange steel.

Merchant Pipe.—Activity is well maintained in the jobbing trade, owing to building requirements in the larger coast cities, though country business is light. Merchants are buying practically nothing for future requirements, but deliveries on former contracts are coming forward rapidly. A good many fair inquiries are coming out in connection with water and gas systems. The Portland Gas & Coke Company, Portland, Ore., was recently in the market for a considerable tonnage of 16-in. pipe, and is believed to have placed its order for steel pipe. Plans are under way for a water line at Centralia, Wash., requiring about 14 miles of 16- or 18-in. There is some activity in oil-line projects in southern California, from which business may develop in the near future, but the regular oil well trade is extremely quiet.

Cast Iron Pipe.—This month's tonnage is somewhat heavier than for January, though there is no great activity. Most of the business since the first of the year has come from southern California, though renewed inquiry is expected at any time in this part of the State. The city of San Francisco will probably be ready for the remainder of the pipe for the fire protection system within another month. The Los Angeles Gas & Electric Company is in the market for 1000 pieces of light weight 6-in., and the town of Long Beach is planning additions to its water system. The city of San Jose, Cal., has ordered a lot of 16- and 20-in., and the city of Sacramento was recently out with an inquiry for 350 pieces of 6-in., but rejected bids with the object of increasing the order. The town of Orange, Cal., will take bids on a lot of pipe March 4, and the town of Rockford, Wash., is in the market for a lot of 4 and 6-in.

Pig Iron.—Foundries working on some special lines of machinery castings are fairly busy, one or two having more work than they can handle, but the tonnage required is not especially heavy, and stocks of ordinary foundry iron on hand are ample for current needs. Shipments from China will probably be resumed at an early date. Frequent small arrivals of English and Continental iron are almost equal to current needs, though purchases of Southern foundry iron are considerably larger than in former years. Several small shipments have recently been made from the electric furnace at Heroult, Cal., but it is not yet much of a factor in this market. Prices are quoted as follows: Chinese foundry iron, $23; English and Continental, ordinary brands, $22; No. 2 Southern foundry iron, $20.50.

Old Material.—New business is slow, though there are some large inquiries for steel melting scrap, and small sales of cast iron scrap are increasing. Steel scrap is rather easy, owing to the scarcity of shipping facilities, offerings being too large for the local market to absorb. Prices are as follows: Cast iron scrap, per net ton, $14; steel melting scrap, per gross ton, $11.50; wrought scrap, per net ton, $12.50 to $13; re-rolling rails, per net ton, $11.

The Pendleton Iron & Metal Company has been incorporated at Los Angeles, with a capital stock of $50,000, by J. H. Pendleton, J. A. and G. A. Murphy, J. H. Alexander and F. C. McKinnie.

Buffalo

BUFFALO, N. Y., March 5, 1912.

Pig Iron.—The market, which has been rather sluggish for the past week or more, has developed a little livelier and wider range of inquiry within the last few days. A good number of the inquiries are from Eastern points for Erie Canal delivery, on the opening of navigation, and many of these request delivered prices. Furnacemen, however, are not inclined to quote in this way on account of the lack of stability in canal rates, and are quoting f.o.b. Buffalo. Some furnaces report only a light volume of sales, but others a fair tonnage, the aggregate reported by Buffalo furnaces for the week being about 9000 tons of all grades, largely in carload orders, with a few of 400 and 500 tons. Furnaces are pressed to the utmost for shipment on contracts, and with the difficulties they have to contend with in car shortages and other conditions, some of them are not considering the taking on of any prompt shipment orders, having all the business they can conveniently handle at present. From the furnacemen's point of view, the situation appears to be becoming stronger with the advent of spring conditions and a more cheer-

ful outlook, and price schedules are more firmly held. We quote as follows, f.o.b. Buffalo:

No. 1X foundry	$14.00	to	$14.25
No. 2X foundry	13.50	to	14.00
No. 2 plain	13.50	to	13.75
No. 3 foundry	13.25	to	13.50
Gray forge	13.00	to	13.25
Malleable	13.75	to	14.25
Basic	13.75	to	14.25
Charcoal	15.75	to	17.25

Coke.—Congested conditions in transportation continue to hamper foundry users badly, although the railroads are making improvement and it is expected that with the continuance of better weather the temporary blockade will be pretty well cleared up by the end of the present week.

Finished Iron and Steel.—The new tonnage booked has been comparatively light, but specifications on contracts have increased somewhat and there is a growing feeling among sellers that there will be a decided improvement in buying in the next 30 days which, with the tonnage that has been held back by the severe weather during January and February and will now come in, will strengthen prices. One interest reports that specifications for the last week in February were much larger than anticipated in all lines, making the total sales for February exceed the total for January. The week has shown a good demand for cold rolled shafting, and prices are considerably stiffer. Business in tin plates and in wire and wire products is coming in in good volume. In fabricated structural lines there is continued evidence of plentiful business for early spring construction. The American Bridge Company has taken 500 tons for the subway superstructure at Elmwood avenue on the Erie Railroad Company's International Bridge line at Buffalo. The Delaware, Lackawanna & Western received bids last week for fabricated steel and concrete bar requirements for bridge work for its new cut-off near Scranton. Bids were opened today for steel for the high school building at Albany, taking 1250 tons. Plans are out and bids will soon be taken for steel for a professional building, Delaware avenue near Chippewa street, Buffalo, to be erected by Hamilton Ward from plans of Dunning & Dunning, architects, requiring about 100 tons.

Old Material.—The market shows some increase in inquiry from consumers, although the railroad congestion caused by the extremely cold weather continues to prevent the free movement of scrap. The demand from outside districts for turnings and borings has fallen off and prices on these commodities have sagged, although not sufficiently to affect the schedule. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$12.50	to	$12.75
Low phosphorus steel	15.75	to	16.00
No. 1 railroad wrought	14.00	to	14.25
No. 1 railroad and machinery cast scrap	13.50	to	14.00
Old steel axles	18.50	to	19.25
Old iron axles	22.00	to	22.50
Old car wheels	11.75	to	12.00
Railroad malleable	12.50	to	12.75
Boiler plate, sheared	13.75	to	14.25
Locomotive grate bars	11.00	to	11.25
Pipe and tank	9.50	to	10.00
Wrought iron and soft steel turnings	7.25	to	7.50
Clean cast borings	6.50	to	6.75

Boston

BOSTON, MASS., March 5, 1912.

Old Material.—The market continues without change in demand or in prices. Some scrap is moving, but not a great deal is offered at prevailing prices. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$8.75	to	$9.00
Low phosphorus steel	11.45	to	11.95
Old steel axles	14.00	to	14.50
Old iron axles	17.00	to	18.00
Mixed shafting	13.00	to	13.50
No. 1 wrought and soft steel	10.00	to	10.50
Skeleton (bundled)	7.00	to	7.50
Wrought iron pipe	8.50	to	9.00
Cotton ties	7.00	to	7.50
No. 2 light	4.50	to	5.00
Wrought turnings	5.75	to	6.25
Cast borings	5.25	to	5.75
Machinery, cast	12.50	to	13.00
Malleable	8.75	to	9.25
Grate bars	6.00	to	6.50
Stove plate	8.00	to	8.50
Cast iron car wheels	11.75	to	12.00

New York

NEW YORK, March 6, 1912.

Pig Iron.—The market continues very quiet. An inquiry from a New England valve manufacturer for 500 tons of foundry iron and 500 tons of malleable is the largest that has come up. There are one or two 500-ton inquiries in this immediate vicinity. So far as can be learned, several hundred tons of iron inquired for by a large pump company last week has not yet been bought. Production in Eastern districts has changed but little in the past month. One merchant furnace in the Schuylkill Valley was blown out. Stocks in furnace yards are believed to have been reduced slightly, but they have been of no considerable volume for several months. The situation appears to be that melters are in no immediate need of iron and they will not buy for forward delivery at prices furnaces are now asking, particularly those in the Buffalo district, which are quoting at 50 cents or more a ton above the level at which sales were made in November. Some further inquiry has come up for iron for export to Italy, both foundry and basic. There is no apparent eagerness for this business, as furnaces are quoting higher prices than those at which export business was put through two or three months ago. Very little is being done in basic iron in Eastern Pennsylvania and the market is nominally $14.25 to $14.50 for such iron delivered at Eastern steel works. We quote as follows for Northern iron at tidewater: No. 1 foundry, $15; No. 2 X, $14.75; No. 2 plain, $14.50 to $14.75. We quote Southern iron at $15 for No. 1 foundry and $14.50 to $14.75 for No. 2.

Finished Iron and Steel.—A recognition that the total volume of business is good seems to keep the trade in a cheerful frame of mind, notwithstanding the keen competition which ensues in the case of large work and which results in the maintenance of the low prices reported last week. Specifications on contracts continue to come in at a fair rate and an interesting thing to report in this connection is that manufacturers are quite generally taking their maximum quantities. In the plate trade, interest is being shown in an inquiry for 5000 tons made by the Standard Oil Company and in the structural field the largest new project regarded as live is a lofty building for the Adams Express Company on Broadway and Exchange alley. Another project on which figures may shortly be asked is an 18-story loft at 12 West Twenty-seventh street, and it is understood that the H. J. Heinz Company is to erect a seven-story warehouse at Brook avenue and 163d street. It should be added that while large attractive work is placed at 1.10c., Pittsburgh, at least one lot of 250 tons of plates was sold at 1.20c., Pittsburgh, and considerable business is being done at the 1.25c. basis. Bar iron orders are reported coming in at an encouraging rate, but they reflect the weakness in steel bars. The American Bridge Company has taken 4500 tons of New York subway work, being section 2, Lexington avenue, making nearly 50,000 tons of subway work awarded to this company. The same company has also taken 500 tons for grade crossings in Buffalo for the Erie Railroad and has three bridges for the Boston & Maine, four others going to the Phoenix Bridge Company, and the total for the seven being about 500 tons. Milliken Brothers are to erect an 1800-ton structure at Thirtieth street and Fourth avenue; the Hedden Iron Construction Company has taken a 525-ton loft at 312 Seventh avenue and the Mount Vernon Bridge Company is to provide 500 tons of grade crossings in Chicago for the Baltimore & Ohio. The Albany high school project, 1000 tons, has again been revived, and the general contract, it is stated, has been awarded. Quotations remain: Steel bars, plates and plain structural material, 1.26c. to 1.31c.; bar iron, 1.27c. to 1.32c., all New York. Plain material from store, New York, 1.65c. to 1.75c.

Cast Iron Pipe.—Much interest is being taken in the opening of bids today by the Department of Water Supply, Gas and Electricity, New York City, on a contractors' job, which will require 6000 tons of high-pressure pipe. Each contractor who bids undoubtedly has secured from some foundry a price on the pipe to be furnished by him, so that the pipe makers are likely to know whether or not they have sold this quantity of pipe when the name of the successful bidder is announced. All the recent announcements of pipe lettings for New York City have been contractors' jobs on which the pipe has been bought privately. The public pipe lettings now in sight in the East are usually for quite small quantities. Within the past few days private buying has also been comparatively light. Carload

lots of 6-in. are quoted at $22 to $23, tidewater, per net ton.

Old Material.—The market is exceedingly quiet. Foundries are buying small quantities of cast scrap, on which prices are maintained, but the steel works and rolling mills are taking practically nothing, as they are either holding up shipments on contracts or making heavy rejections. Old car wheels are lower, with light transactions. Quotations are about as follows, per gross ton, New York and vicinity:

Old girder and T-rails for melting	$9.00 to	$9.50
Heavy melting steel scrap	9.00 to	9.50
Relaying rails	20.00 to	20.50
Rerolling rails (nominal)	11.50 to	12.00
Old iron car axles	19.00 to	20.00
Old steel car axles	13.50 to	14.00
No. 1 railroad wrought	11.50 to	12.00
Wrought iron track scrap	10.50 to	11.00
No. 1 yard wrought, long	9.50 to	10.00
No. 1 yard wrought, short	9.00 to	9.50
Light iron	4.25 to	4.75
Cast borings	5.75 to	6.25
Wrought turnings	6.50 to	7.00
Wrought pipe	9.25 to	9.75
Old car wheels	11.00 to	11.50
No. 1 heavy cast, broken up	11.00 to	11.50
Stove plate	8.75 to	9.00
Locomotive grate bars	9.00 to	9.50
Malleable cast	9.00 to	9.50

The German Iron Market

BERLIN, February 22, 1912.

The strength of the iron market has been fully maintained. The advance of prices on the Düsseldorf Exchange, predicted in last week's letter, occurred on a larger scale than had been expected. The following changes were noted (previous quotations in parentheses): Spiegeleisen, 77 marks (72); high grade puddling pig iron, of Siegerland and Rhine-Westphalian make, 65 marks (62); Siegerland steel-making grades 68 to 69 marks (64 to 65); same, Rhine-Westphalian make, 70 to 71 marks (66 to 67); German Bessemer, 77.50 marks (74.50); German No. 1 foundry, 73.50 marks (70.50); same, No. 3, 70 marks (67.50); German hematite, 77.50 marks (74.50); ordinary iron bars, 135 to 138 marks (132 to 135); basic steel bands, 135 to 140 marks (132.50 to 137.50); heavy plates, 133 to 135 marks (130 to 132); boiler plates, 143 to 145 marks (140 to 142); thin plates, 142.50 to 147.50 marks, (140 to 145). The market was characterized in the official report as unvaryingly firm, and it was added that the calls for delivery were heavy. According to news from the Luxemburg district, 80,000 tons of basic pig iron has been sold to Belgian buyers at an advance of 8 francs over the last previous sales to that country.

The Steel Works Union held its usual monthly meeting yesterday and gave out its market survey. This reports that the home trade in semi-manufactured material is quite brisk and the calls for delivery so heavy that they can hardly be met on time. Business for the second quarter of the year was today declared open at unchanged prices and conditions. The foreign market is also in a favorable state. The Prussian railroad authorities have given supplementary orders for 26,000 tons of track-building supplies. Further foreign orders of considerable volume for steel rails have recently been taken, including some good orders for Germany's African colonies. Foreign business in structural shapes has continued excellent, and orders are coming in satisfactorily.

It awakens misgivings on the stock markets that nothing was said at this meeting about the prolongation of the Union. It is now only a little more than two months till the works have the right to begin selling upon their own account, if the Union has not meanwhile been renewed; and so far as appears nothing is doing toward bringing about an agreement.

Germany's exports of iron and steel of all kinds in January amounted to 463,154 tons, comparing with 542,129 tons in December and 395,966 tons in January, 1911. The excess of exports over imports reached 408,997 tons, which was some 73,000 tons less than for December.

An Essen dispatch of today states that the new establishment of the Thyssens (owners of the Gewerkschaft Deutscher Kaiser) located in Lorraine and previously mentioned in this correspondence, will be considerably enlarged in capacity. A new steel mill is to be built at Strasburg in Alsace by Netter & Jacobi, who will probably build another one later in the lower Rhine region. The purpose of the new establishment, which will have at first a capacity of 15,000 tons a year, is "to make the firm independent of the Steel Works Union for its steel supplies."

The news this week from Belgium is somewhat contradictory. Several days ago a drop of 1 shilling a ton for export bars of basic steel and wrought iron and heavy and light plates was reported. It was mentioned that these were the first price reductions in the Belgian market for seven months and it made a rather bad impression on the Berlin share market. Today, on the other hand, a Brussels dispatch reports that the furnaces around Charleroi have just raised pig iron 1 and 2 francs per ton, according to grades. Market reviews from Belgian correspondents describe the situation as considerably quieter than in January.

Metal Market

NEW YORK, March 6, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Feb.	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
29	14.50	14.37½	43.00	4.00	3.92½	6.90	6.75
Mar.							
1	14.62½	14.50	43.00	4.00	3.92½	6.90	6.75
2	14.62½	14.50	.....	4.00	3.92½	6.90	6.75
4	14.62½	14.50	43.30	4.00	3.92½	6.90	6.75
5	14.62½	14.50	43.60	4.00	3.92½	6.97½	6.82½
6	14.62½	14.50	43.25	4.00	3.92½	6.97½	6.82½

Copper is higher after a short period of activity. Tin is easier, with future delivery mostly in demand. Tin plates are unchanged. The low price of lead still prevails. Spelter is higher and the outlook is for still higher prices. There is no change in antimony.

New York

Copper.—Higher prices are being asked and obtained for copper directly as a result of the decrease in stocks and a very good business done Friday and Saturday of last week. The metal bought on those two days ran into millions of pounds and was for consumption, despite the fact that many large consumers were said to be stocked up for many months to come. The price during the active period of the market was about 14.50c. cash, 30 days, delivered. The metal is strong to-day at prices ranging from 14.50c. to 14.62½c. for electrolytic and 14.62½c. to 14.75c. for Lake. The firm state of the market is expected to continue and prices to go still higher. The Copper Producers' statement, to be issued March 8, it is generally accepted, will show a further decrease in stocks. In addition to this situation, some of the big sellers are said to be well sold up, and to have nothing to offer for March or April delivery. The price of spot copper in London today is quoted at £65 1s. 3d.; futures, £65 16s. 3d. The exports of copper so far this month total 3034 tons.

Copper Averages.—The Waterbury average for the month of February was 14.50c. The average New York price of Lake copper for February was 14.40⅝c. and of electrolytic, 14.25c.

Pig Tin.—The market in pig tin has been quiet throughout the week, with very little business done except on Friday last, when there was a fair demand for April, May and June delivery and considerable selling in those positions. The tin statistics for February made public March 1 showed a visible supply smaller than that of a year ago by about 2200 tons, but created little or no stir in the market. The metal is easier today, with supplies a little more plentiful, 43.25c. being quoted. The price quoted for spot tin in London today is £194 10s.; futures, £190. The arrivals of tin this month have been 490 tons and the amount afloat is 2625 tons.

Tin Plates.—There are no features in the tin plate market in New York and the price remains unchanged at $3.54 for 100-lb. coke plates. The price of tin plates laid down in Swansea, Wales, is 13s. 6d.

Lead.—Conditions are unchanged in lead, the low prices fixed by the American Smelting & Refining Company continuing to dominate the market, and the demand is quiet. In New York 4c. is quoted and in St. Louis, 3.92½c., although independents in the West are asking 3.95c. to 4c. The lead situation is likely to be seriously affected by news from the West. The lead field in southwest Missouri is threatened with a strike by the 5000 employees of companies operating in that district, which is a very heavy producer of deep mined lead. The miners are preparing to demand an increase in wages approximating $1 per day. Conditions are said to have been bad in the field since the reduction in wages in 1907.

Spelter.—As a result of the continued scarcity of spelter and a covert demand on the part of consumers, it has advanced within the week and actual sales were made yesterday at 6.82½c., St. Louis. It is expected that the price will reach 7c., St. Louis. One influence causing the increase in price is the disordered condition of affairs in Mexico which has cut off supplies from that country. It is impossible to get some brands of prime Western spelter for prompt shipment.

Antimony.—There are no changes in antimony except in Chinese and Hungarian grades, which are a shade higher. Cookson's is quoted at 7.25c., Hallett's at 7.37½c. and Chinese and Hungarian grades at 6.80c. to 6.85c.

Old Metals.—Dealers report a moderate demand. Selling prices are firm as follows:

	Cents per lb.
Copper, heavy and crucible	13.50 to 14.00
Copper, heavy and wire	13.25 to 13.50
Copper, light and bottoms	12.00 to 12.25
Brass, heavy	8.75 to 9.00
Brass, light	7.00 to 7.25
Heavy machine composition	11.00 to 11.25
Clean brass turnings	8.25 to 8.50
Composition turnings	9.50 to 10.00
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	5.25

Chicago

MARCH 4.—The movement of metals has been only fair. Copper quotations have shown increased strength while tin prices are slightly lower. Old metal prices have followed the general trend of the metal market and buying prices for copper and brass show advances. We quote as follows: Casting copper, 14.50c.; Lake, 14.75c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 44.50c.; small lots, 45.50c.; lead, desilverized, 4c. to 4.05c., for 50-ton lots; corroding, 4.25c. to 4.30c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.75c. to 6.85c.; Cookson's antimony, 8.50c., and other grades, 7.50c. to 8c., in small lots; sheet zinc is $8.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount, in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 12c.; copper bottoms, 11c.; copper clips, 11.75c.; red brass, 11c.; yellow brass, 8.75c.; lead pipe, 3.60c.; zinc, 4.50c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 37c.

St. Louis

MARCH 4.—The metal markets have shown a stiffening tendency for the Missouri produced brands, and as a result lead to-day is quotable at 4c. to 4.05c. with few sellers at these figures. Spelter is up to 6.75c. for spot, with futures ranging down to 6.40c. according to date of delivery. Tin is quiet at 43.35c.; Lake copper, firm at 14.90c.; electrolytic copper, steady at 14.80c., and Cookson's antimony, strong at 7.60c. The demand, so far as quantity goes, has been rather quiet. In the Joplin market the gain in strength of ore was largely due to the upward tendency of spelter prices. Shipments generally were heavy. Lead ore was in stronger demand. Miscellaneous scrap we quote as follows: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 3.50c.; lead, 3.50c.; pewter, 21c.; tinfoil, 31c.; tea lead, 3c.

The American-Dartium Steel Castings Company, with a capital stock of $150,000, has been organized to manufacture steel castings and tool steel under the Dartium process. Ground has been purchased in Kansas City, Mo., for the erection of two factory buildings, 50 x 95 ft. and 80 x 150 ft. Edward Richards, with offices in the Finance Building, is vice-president of the company.

The National Association of Brass Manufacturers will hold its spring meeting at the Hotel La Salle, Chicago, March 19 and 20. William M. Webster, commissioner, Schiller Building, Chicago, states that a well-attended meeting is indicated.

At the annual meeting of the board of directors of the Goulds Mfg. Company, Seneca Falls, N. Y., held February 26, all the officers who have served the past year were re-elected. In the annual report on the business of the year a slight increase over the preceding year was shown in both the gross amount of sales and net profits.

Iron and Industrial Stocks

NEW YORK, March 6, 1912.

The stock market has shown continued strength for some days and prices of stocks were on a generally higher level than at the corresponding time the previous week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., pref...	4 - 5	Pressed Steel, pref.	96 - 97
Baldwin Loco., com.	50⅞	Railway Spring, com.	27¾ - 29¼
Baldwin Loco., pref.	103⅛-103½	Railway Spring, pref.	102 -102½
Beth. Steel, com...	27⅞ - 29⅞	Republic, com.	16¾ - 19¾
Beth. Steel, pref...	57½ - 59½	Republic, pref.	66 - 70⅜
Can, com.	11⅜ - 12⅜	Pipe, com.	14¼ - 14⅞
Can, pref.	91⅜ - 94	Pipe, pref.	51 - 51¾
Car & Fdry., com..	51 - 53⅜	U. S. Steel, com.	59⅞ - 64¼
Steel Foundries.	28 - 28¾	U. S. Steel, pref.	107⅜-109⅜
Colorado Fuel	23⅛ - 26	Westinghouse Elec..	73¼ - 74½
General Electric	159¾-165	Va. I. C. & Coke..	54 - 57
Gr. N. Ore Cert.	37 - 38	Am. Ship, com.	48
Int. Harvester, com.	106¾-108¼	Am. Ship, pref.	102¼
Int. Harvester, pref.	119⅝-120	Chic. Pneu. Tool..	46 - 46¾
Int. Pump, com.	28	Cambria Steel	41½ - 42¼
Int. Pump, pref.	79½ - 81	Lake Sup. Corp.	29 - 29¼
Locomotive, com.	32 - 34½	Pa. Steel, pref.	100
Locomotive, pref.	104⅞-105½	Warwick	11
Nat. En. & St., com.	12¼ - 13½	Crucible Steel, com.	10 - 11
Nat. En. & St., pref.	88	Crucible Steel, pref.	80½ - 82
Pittsburgh St., pref.	101 -101¼	Harb. Wk. Ref., com.	40
Pressed Steel, com.	28⅞ - 31		

A special meeting of stockholders of the Pittsburgh Steel Company will be held in its offices in the Frick Building, Pittsburgh, on May 1, to vote on a proposed increase in its capital stock from $14,000,000 to $17,500,000 by the issue of $3,500,000 of additional 7 per cent. cumulative preferred stock, the proceeds to be used for the building of two blast furnaces and other additions to the plant of this company at Monessen, Pa.

The Realty Guarantee & Trust Company, Youngstown, Ohio, is offering the unsold portion of the underwriting for $1,200,000 7 per cent. cumulative (non-voting) preferred stock of the Brier Hill Steel Company at 105 and interest. Callable after 1922 at $105 per share and accumulated (quarterly) dividends.

Lee, Higginson & Co., New York, Boston and Chicago, and Higginson & Co., London, recently offered at 102 and accrued dividend an issue of $1,250,000 6 per cent. cumulative preferred stock of the Lowell Machine Shop, Lowell, Mass., sold to provide additional working capital. Redeemable as a whole, but not in part, on any dividend date after 60 days' notice at $115 per share and accumulated dividends.

Dividends Declared

The Railway Steel Spring Company, regular quarterly, 1¾ per cent. on the preferred stock, payable March 20.

The American Can Company, regular quarterly, 1¼ per cent. on the preferred stock, payable April 1.

The American Car & Foundry Company, regular quarterly, of ½ per cent. on the common and 1¾ per cent. on the preferred stock, both payable April 1.

E. & T. Fairbanks & Co., $5 per share, payable March 15.

The Cambria Iron Company, regular semi-annual, 2 per cent., payable April 1.

La Belle Iron Works, regular quarterly, 2½ per cent., payable April 1.

Naylor & Co., New York and Philadelphia, have been appointed exclusive sales agents in Pennsylvania, Delaware, Maryland, New York and New England for ferrosilicon produced by the Globe Iron Company, Jackson, Ohio.

The Portsmouth Steel Company, Portsmouth, Ohio, has amended its charter, increasing the authorized capital stock from $1,000,000 to $3,000,000. It recently added another plate mill, two jobbing mills and sheet mills to its equipment.

The monthly meeting of the Pittsburgh Foundrymen's Association was held in Engineers' Hall, Oliver Building, Pittsburgh, on Monday evening, March 4. The paper of the evening was by David McLain, manager of the Milwaukee Corespondence Schools, on "Mixing and Melting."

Notices recently posted by the receivers of the Central Iron & Steel Company, Harrisburg, Pa., announced a general reduction of wages in the operating departments.

Mulcahy & Gibson, fabricators of steel structures, have moved into new offices at Thirty-third street and Madison avenue, New York.

Personal

John Birkinbine, Philadelphia, gave a very interesting address before the Mahoning Valley Historical Society, Youngstown, Ohio, Saturday evening, February 24, having as his subject, "The Story of Iron." J. G. Butler, Jr., is president of the society.

J. J. O'Conor, of the Washington Tin Plate Company, Washington, Pa., has been elected secretary of the Association of Sheet and Tin Plate Manufacturers, recently formed at Pittsburgh. His office will be at 1627 Oliver Building.

J. M. Taylor has succeeded F. W. Hutchings as secretary of the National Founders' Association, with headquarters at Detroit. Mr. Hutchings resigned some weeks ago to become treasurer of the Lake Superior Iron & Chemical Company, Detroit. Mr. Taylor has been stationed in New York as Eastern representative of the association for a number of years. D. B. Hinckley, who was Mr. Hutchings' assistant in the Detroit office, has been put in charge of the New York office.

E. A. Wilson has resigned as manager of the Ohio File Renewing Company, Niles, Ohio, to become manager of the metal lath department of the Brier Hill Steel Company, Youngstown, Ohio. At the annual election of the former company a few days ago W. F. Thomas was elected president and treasurer; H. A. Hoffmaster, vice-president, and E. A. Wilson, secretary. Mr. Thomas will manage the business until a successor to Mr. Wilson is secured.

Charles W. Kelley has been elected president of the Bruce-MacBeth Engine Company, Cleveland, Ohio, to succeed W. C. Bruce, resigned. Mr. Bruce will retain his interest in the company and will remain on the board of directors but will devote most of his time hereafter to the Bowler Foundry Company, Cleveland, of which he is president.

Frank Illenberger, Detroit, Mich., on March 1 severed his connection with the Colonial Steel Company. He retains his office at 1517 Fort Building, Detroit, where he will continue the handling of tool and alloy steels. He will add to this line sheets, plates and other steel commodities, and also aluminum, brass and bronze castings made by the Columbia Castings Company, Detroit, of which he is president.

William J. Norris has resigned as assistant manager of the Chicago office of the Wheeling Corrugating Company. He has been associated with that company for the past 17 years and will, after a vacation period, engage in the same line of business for himself.

Joel Dean, formerly manager of the Buffalo office of the Fairbanks Company, has been transferred to the Pittsburgh office in the same capacity.

W. L. Laib, vice-president of the Hanna Engineering Works, Chicago, heretofore in charge of the sales, advertising and accounting departments of the company, has been made factory manager, with complete supervision therein.

James L. Hough, formerly with the Marshall & Huschart Machinery Company, has been appointed sales manager of the E. L. Essley Machinery Company, 555 West Washington Boulevard, Chicago. J. J. Shanahan has been appointed sales representative of the E. L. Essley Machinery Company in Michigan and Indiana.

Walter M. Bush, who until recently gave his entire attention as secretary-treasurer to the business of the Baltimore Bridge Company, Baltimore, Md., has, since the sale of that company's plant to the Carnegie Steel Company, been devoting his time to the Tube Bending & Polishing Company, of that city, of which he is assistant treasurer.

George L. Brown, treasurer of the Marshall Foundry Company, Pittsburgh, has gone to California on an extended business trip.

T. Coleman Ward, resident manager of Hickman, Williams & Co., pig iron and coke, Pittsburgh, has returned from a visit to the Panama Canal.

W. A. Stone, Uniontown, Pa., has been elected president of the Keystone Tube Works, Inc., Connellsville, Pa. Albert Geddes, also of Uniontown, is vice-president and James E. McNary, of Connellsville, is secretary and treasurer.

J. H. Frantz, vice-president of the Columbus Iron & Steel Company, Columbus, Ohio, has returned from a three-weeks' trip to Florida and Cuba.

Obituary

HIRAM NEWTON TURNER, president of E. & T. Fairbanks & Co., scale manufacturers, died of pneumonia February 16, at his home in St. Johnsbury, Vt., aged 72 years. He was born in Bethlehem, N. H., and entered the railroad business at an early age, advancing rapidly until he became general traffic manager of the Boston & Lowell. Col. Franklin Fairbanks, late president of E. & T. Fairbanks & Co., came in contact with Mr. Turner in railroad matters and made him a flattering offer to become assistant general manager of that corporation. He accepted and assumed his new duties February 12, 1889. Although 50 years of age at the time he entered this new field of industry, his executive ability soon began to be felt, and he became manager and later on president. At the time of his death he was also president of the Connecticut & Passumpsic Rivers Railroad, vice-president of the St. Johnsbury & Lake Champlain, president of the Lake Champlain & St. Lawrence Junction and a director in several other local railroads. He leaves a widow and two sons.

JOHN H. O'DONNELL, Waterbury, Conn., prominent as a designer and manufacturer of wire machinery, died February 27, aged 48 years. He was brought up in Worcester, Mass., and his early training was in the works of the Washburn & Moen Mfg. Company. He went to Waterbury, but returned to Worcester to enter the employ of the Morgan Construction Company, where his services were used in the development of wire drawing machinery. For a number of years he had been connected with the Waterbury Machine Company as superintendent and continued with the business after its absorption by the Waterbury Farrell Foundry & Machine Company. He leaves a widow.

FRANK W. WEBB, Boston, Mass., president of the F. W. Webb Mfg. Company of that city, manufacturer and dealer in plumbing supplies, died March 3. Born in Baltimore, the son of Henry M. Webb, he began his business career with the hardware firm of H. W. Webb & Sons. He went to Boston in 1888 as manager of the Boston branch of the Henry McShane Mfg. Company, plumbing supplies. In 1900 the F. W. Webb Mfg. Company was organized, and Mr. Webb became the president and general manager. He leaves a widow and a daughter.

W. D. HOFIUS of the Hofius Steel & Equipment Company, Seattle, Wash., died February 28 at his home in that city. He began as a day laborer in a foundry and rose to prominence in manufacturing and commercial circles.

The wages and hours of labor obtaining in the iron and steel industry were recently made a subject of an investigation directed by a resolution of the United States Senate. The result of the investigation has now appeared in print as Senate document No. 301, presented by Senator Borah, and is a pamphlet of 57 pages prepared under the direction of Chas. P. Neill, commissioner of labor, Department of Commerce and Labor, Washington, D. C. It takes up the earnings and hours and days of work in blast furnaces, rolling mills and steel works, by departments and districts, and in general is a compilation of statistics on the basis of nearly 200,000 employees in 416 different plants, in 25 States, covering 338 blast furnaces, rolling mills and steel mills and 78 steel foundries.

An automatic cash fare recorder in the office of the auditor of any electric street car company is the latest invention of Adolphus D. Branham, president of the Automatic Register Company, East St. Louis, Ill. The fare is also automatically recorded on each car. Attached to the conductor's receiving box is an electric wire, which leads to the trolley wire and thus in connection with the auditor's office. Should the conductor, in making his daily report, make a miscalculation an investigation of the device in the auditor's office would quickly reveal it.

Pittsburgh and Vicinity Business Notes

The Pittsburgh office of Joseph T. Ryerson & Son of Chicago will be removed about May 1 from the Frick Annex Building to the twenty-second floor of the Henry W. Oliver Building.

The Pittsburgh office of the Electric Controller & Mfg. Company of Cleveland, Ohio, will be removed May 1 from 515 Frick Building to the fifteenth floor of the Henry W. Oliver Building.

The Jones & Laughlin Steel Company, Pittsburgh, has received a contract for 15 signal bridges for the New York Central Railroad, requiring 10 tons of steel each, and another for 350 tons of steel for caissons for piers for the Panama Canal.

The board of trustees of the Carnegie Technical Schools at Pittsburgh has announced that it will apply for a charter for the schools, and it is also probable that the name will be changed to the Carnegie Institute of Technology.

At the annual meeting of the Niles Car & Mfg. Company, Niles, Ohio, recently held, the old board of directors was re-elected as follows: George D. Kirkham, A. F. Harris, A. G. McCorkle, F. C. Robbins, T. E. Thomas, B. F. Pew, L. H. Young, A. G. Webb, J. A. Hanna. The directors re-elected the following officers: F. C. Robbins, president and general manager; T. E. Thomas, vice-president; C. E. Rose, secretary and treasurer.

The Meadville Malleable Iron Company, Meadville, Pa., held its annual meeting recently, at which a dividend of 3 per cent. was declared. Officers were re-elected as follows: Otto Kohler, president; J. E. Reynolds, vice-president; L. L. Lord, treasurer. P. W. Kaufman continues as secretary of the board and general manager. It is the intention of this company to build some additions to its plant in the near future.

The James A. Reese & Sons Company, Pittsburgh, has received an order for three light draft river steamboats and six galvanized steel barges with flat bows, all to be delivered July 1. Another order is the construction of a light draft river gunboat, of steel, carrying seven guns of small caliber, and to be used as a ram in offensive work. This craft is the first of its kind to be built by the company in Pittsburgh, and is for a small South American republic.

W. G. A. Miller, Howard Zackarias and Agnes Somerville have applied for a charter of incorporation for the Somerville Iron & Bronze Works, Pittsburgh, for manufacturing, buying and selling, constructing and erecting iron and steel and ornamental iron, bronze and brass.

The Knox Pressed & Welded Steel Company, Farmers' Bank Building, Pittsburgh, manufacturer of doors and door frames for open-hearth furnaces, has installed its appliances in 15 different open-hearth plants, three of which have been completely equipped, and repeat orders have been received from several others. It is operating its plant at Niles, Ohio, to practically full capacity.

R. B. Murray, Farmers' Bank Building, Pittsburgh, has received an order for two 300 hp. four-valve Russell engines for operating ventilating fans in a coal works of the Crucible Coal Company.

The John Eichleay, Jr., Company, Pittsburgh, structural steel fabricator, has opened new offices at 419 Fourth avenue.

The Morgan Construction Company, Worcester, Mass., which recently secured the contract for the erection of a blooming mill, billet mill and rod mill for the Steel Company of Canada, Hamilton, Ont., Canada, has sublet to the United Engineering & Foundry Company, Pittsburgh, a contract for the soaking pits, ingot buggy and approach table, a 34-in. two-high reversing blooming mill with tables and manipulator, a bloom shear and tables, and full equipment for the roll shop.

The Dillon Safety Razor Company, Pittsburgh, has applied for a charter under the laws of Delaware, with a capital of $1,000,000. The incorporators are S. V. Dillon, Charles F. Lewis and W. A. McCoy.

The Western Tool & Forge Company, Brackenridge, Pa., has increased its indebtedness from $100,000 to $168,000 and its capital stock from $500,000 to $700,000.

At the annual meeting of stockholders of the Portage Silica Company, Youngstown, Ohio, held recently, directors were elected as follows: J. G. Butler, Jr., J. B. Chambers, H. H. Hoffmaster, Henry A. Butler, E. E. Klooz and H. Z. Kelly. The directors elected the following officers: J. C. Butler, Jr., president; J. B. Chambers and H. H. Hoffmaster, vice-presidents; E. E. Klooz, secretary and general manager, and H. Z. Kelly, treasurer and sales manager. The company recently signed a contract with the National Malleable Castings Company for its requirements of steel molding sand at the Sharon works for 1912. The minimum tonnage is 30,000 tons, or 150 tons for each of the 200 days considered a season. The contract was awarded only after the Portage sand had been shown to give exceedingly satisfactory results.

D. L. Wilkoff, formerly of the Pittsburgh Iron & Metal Company, has sold his interest in it and is now connected with the Pennsylvania Iron & Steel Company, recently organized to deal in iron and steel scrap, and which will have a yard on the Allegheny Valley Railroad at Twenty-eighth and Smallman streets, Pittsburgh.

The L. A. Green Company, now located at 419-420 Park Building, Pittsburgh, dealer in rails, machinery and equipment for mills, mines and contractors, has leased a building now under erection at 3145 Penn avenue in that city, which it expects to occupy about April 1. The building will have about 7000 sq. ft. of floor space and will provide display and warehouse room in addition to offices. The company's name will shortly be changed to L. A. Green Equipment Company.

The National Roll & Foundry Company, Farmers' Bank Building, Pittsburgh, with works at Avonmore, Pa., has received a contract from the Follansbee Brothers Company for a two high 30-in. reversing bar mill, together with tables and cooling beds, for addition to the plant at Follansbee, W. Va., and is shipping to the same plant this week two new cold mills. It is also shipping some sheet stretching machines and doubling and trimming shears to the American Rolling Mill Company, Middletown, Ohio, and has received orders for a number of alligator shears for scrap dealers to be used for cutting up scrap.

The Greenville Metal Products Company, Greenville, Pa., has closed a contract with the Empire Automobile Company, Indianapolis, Ind., covering its requirements for automobile parts for five years, and is remodeling its factory to take care of this large order.

The Forter-Miller Engineering Company, Hartje Building, Pittsburgh, has received an order from Spang, Chalfant & Co., Inc., for 18 standard Forter water seal gas producers, for their works at Etna, Pa. They have had 22 Forter gas producers in use for some time, but are making some large extensions to their plant and found it necessary to increase the gasifying capacity to a total of 40 producers. The Forter-Miller Company also recently received contracts for similar gas producers from the Allentown Flint Bottle Company, Allentown, Pa.; Brockwayville Machine Bottle Company, Brockwayville, Pa.; Charles Boldt Company, Cincinnati, Ohio, and Columbian Enameling & Stamping Company, Terre Haute, Ind., and has just finished seven at the plant of the Corning Glass Works, Corning, N. Y.

The Ohio Iron & Metal Company, Farmers' Bank Building, Pittsburgh, has entered a complaint with the State Railroad Commission against the charges of the Pennsylvania Railroad Company for moving mill cinders and mill scale from Franklin to Kittanning.

The Rosedale Foundry & Machine Company, Pittsburgh, has received an order for two additional Playford chain grate stokers to be installed in the Park Works of the Crucible Steel Company of America, Pittsburgh.

The J. & J. B. Milholland Company, Pittsburgh, manufacturer of special machinery, received orders in February for over 600 tons of steel castings and forgings to be machined and used in the construction of river improvement work in various parts of the country. At the annual meeting, held recently, A. Hufschmidt was elected president and treasurer and A. J. Hufschmidt secretary. The company is running full time and is making plans for increasing its capital stock. It will change its motive power from natural gas to electric drive.

The Penn Motor Car Company, Pittsburgh, has increased its indebtedness from nothing to $150,000. It is stated that it will build a new plant for the building of motor cars in the Pittsburgh district.

John V. Brokaw has bought the realty, plant and patents of the Canton Foundry & Heating Company, Canton, Ohio, at auction sale, the price being given as $10,300.

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The Tariff Hearings at Washington

SENATOR SIMMONS: Where is your plant located?

MR. RAMSEY: We have plants in Pittsburgh, in Syracuse and in Newark, N. J.

SENATOR SIMMONS: Now, is that part of your raw material that you buy from abroad manufactured in this country?

MR. RAMSEY: Some of it; very little, though.

SENATOR SIMMONS: It is absolutely negligible, is it not?

MR. RAMSEY: Yes; I should say so.

SENATOR CLARK: Could you get all this raw material in this country if you chose to do so?

MR. RAMSEY: I am not altogether certain of that. We have practically all of the alloys here, but at times we cannot get them at all—that is, certain alloys. Then we have to go abroad for them.

SENATOR CLARK: Why can you not get them here? Are they not produced, or is it on account of the price?

MR. RAMSEY: It is on account of the scarcity of them as much as anything else. The price does not enter into it as a rule.

SENATOR CLARK: What are those alloys?

MR. RAMSEY: Well, perhaps I am wrong in saying "alloys." One of the main things that comes into our product is clay for the manufacture of crucibles.

SENATOR CLARK: Could you get all the raw material for your product in this country so far as the steel is concerned?

MR. RAMSEY: Yes.

THE ACTING CHAIRMAN: What is it you do buy abroad?

MR. RAMSEY: We buy tungsten abroad, which enters into high speed steel.

SENATOR SIMMONS: Is it produced in this country?

MR. RAMSEY: They are producing some of it in this country now.

SENATOR SMOOT: And we could produce more if the present tariff were to remain on it long enough. The House has again put it on the free list in this bill.

SENATOR HEYBURN: The tungsten industry is in its infancy, and we are beginning to develop tungsten mines in this country on a large scale and will do it if we are freed from competition from abroad. I know about the tungsten product.

High Speed Steel

THE ACTING CHAIRMAN: Go on, Mr. Ramsey.

MR. RAMSEY: High speed steel, I would like to say, up to the last tariff act had not been covered by the tariff at all. It was a new steel. It was a development in steel. It has grown very fast. It is made by ourselves, speaking of the Crucible Steel Company of America, and the other steel manufacturers as well.

SENATOR CLARK: What do you mean by high speed steel?

MR. RAMSEY: It is a steel that runs at a very high rate of speed, makes very deep, heavy cuts and enables a machinist to turn out four or five times as much work with one tool as he did with the old carbon steels. Now the cost of this steel, because of the large amount of tungsten that enters into it, is very high. It goes through a great many operations, every operation being one of labor all the way through. Outside of the tungsten the mixture costs very little more than the ordinary steel. By the time we finish we have had labor on it to the extent of about, I should say, $400 a ton. Now that is a whole lot of money to put on a ton of steel.

SENATOR HEYBURN: What is the price of the tungsten?

MR. RAMSEY: About 75 cents a pound.

SENATOR SIMMONS: How long had you been producing high speed steel in this country before the Payne-Aldrich bill?

MR. RAMSEY: I should say about three years. The American manufacturer was trying to make some headway in the manufacture of a steel of this character, but he was unable to do so because the foreigner could undersell him. The foreigner undersold him right straight along. It was from that time that it began to get a foothold.

SENATOR SIMMONS: Was that because there was no tariff on it or because you had not learned as well how to do the thing as the foreigner, who had been manufacturing it for a long time?

MR. RAMSEY: I think at the very beginning the European got on to the development first, although the idea was an American idea—the idea of high speed steel.

SENATOR GALLINGER: You had not learned how to compete successfully with the foreigner when you paid twice as much in wages as he did, had you? You had not learned that?

Labor Here and Abroad

MR. RAMSEY: We are paying more for our skilled labor than they pay abroad. That is the point I make. Where we pay an American $4 a day in the mill the English or German manufacturer has the work done for $1.75 a day.

SENATOR SIMMONS: Do you mean in the same mills?

MR. RAMSEY: In the same character of mills and in the same character of work.

SENATOR SIMMONS: That applies to skilled labor. How about your unskilled labor?

MR. RAMSEY: I think the same proportion applies to the unskilled labor.

SENATOR SIMMONS: You say that you have been producing high speed steel in this country for about three years. How long have they been producing this same article or class of material in England, or in Europe?

MR. RAMSEY: In Europe, put it. I think the introduction of high speed steel dates from about 1901 or 1902.

SENATOR CLARK: What percentage of the cost of your product is chargeable to labor?

MR. RAMSEY: I would say 50 to 55 per cent.

[Mr. Ramsey here described the process of making crucible steel, starting with the selection of the mixture.]

SENATOR WILLIAMS: And then?

MR. RAMSEY: After that is done it is poured into a mold—an ingot mold. We will assume we are ready for the ingot to be put into a bar. We take it to a furnace and heat it. When we inspect it, we cut off a good deal of it in the way of scrap. There is a lot of it that comes off for scrap, because we are looking for defects and we lose one-fourth or one-fifth in that process—perhaps a little bit more. Then we take it to a furnace to be heated for the hammer men.

SENATOR WILLIAMS: That is done by machine hammers, is it?

MR. RAMSEY: Yes; the hammering is done by machines, and the rolling would be done by machines. Whatever may be the form it is to take, from the size of the bar we want to make, or from the process we want to put it through, we hammer it or roll it. After it is finished it goes through a course of inspection. We lose a great deal of the finished bar in that inspection. Then if the bar is all right and satisfactory we label it and either ship it out to the customer or put it in the racks, as the case may be.

SENATOR WILLIAMS: Your unskilled labor is for the most part engaged in the carrying of the materials from one place to another?

MR. RAMSEY: Yes.

SENATOR WILLIAMS: And the balance of your work is done by machinery, is it not?

MR. RAMSEY: Yes; skilled labor in connection with the machinery.

SENATOR WILLIAMS: What degree of skill is required to handle one of these machines—say your hammer?

MR. RAMSEY: A hammer man goes through a slow process of education. It is supposed to be a very difficult class of work. It is done by the eye altogether, and you can imagine the skill that is required when I tell you that one of these men will take a bar, say 18 or 20 ft. long, and hammer it into a seven-eighths inch octagon. It is all done by the eye, all the way along, clear through. He turns it from one side to the other, and he has a helper standing there measuring it for him, but it is all done by his eye—the whole length of 18 ft.; and I submit that that requires some skill.

SENATOR WILLIAMS: What degree of skill is required in managing one of the rolling machines?

MR. RAMSEY: The same amount of skill is required, but not in the same way. A hammer man goes through a course of education. Perhaps it takes him three or four or five years, depending altogether upon his aptitude to develop into what we would call a first-class hammer man—that is, on these rather difficult shapes, octagons and hexagons, and things like that. A roller goes through perhaps as much experience. He starts away down the ladder, and by one process or another becomes a heater, and finally an assistant roller, and then a roller.

SENATOR WILLIAMS: After you have this finished product, is it of any better quality than that which the foreigner makes?

MR. RAMSEY: We think so.

SENATOR WILLIAMS: On its own merits, then, it ought to sell for a higher price?

MR. RAMSEY: Well, we rather hope so all the time, but we are continuously disappointed.

SENATOR WILLIAMS: You have not thus far been able to sell it as cheaply as he does?

MR. RAMSEY: No, sir.

The Selling Price of Steel

SENATOR WILLIAMS: What is, about, the difference in the price at which you can sell it and at which he offers it on the market?

MR. RAMSEY: That is a very hard question to answer, because the prices are not fixed. I do not know that I can answer that question intelligently to the committee. Some of the imported steels sell at very high prices and some at very low prices.

SENATOR WILLIAMS: You cannot answer that question accurately?

MR. RAMSEY: I cannot answer that question accurately to the committee.

SENATOR SIMMONS: You said you made in all of your plants 75,000 tons, did you not?

MR. RAMSEY: About 75,000 tons.

SENATOR SIMMONS: What proportion of that do you make?

MR. RAMSEY: I should say we make 60 per cent. of it. I would like to draw to your attention again a remark I made at the beginning, that in order to show what this industry is and the great number of men it employs, you only have to compare that tonnage, which seems almost infinitesimal in comparison, with the tonnage of open-hearth and Bessemer steel, which was last year 25,000,000 tons, and it is all made up of skilled labor. It is all made up of costs. We manufacture one particular steel that I have in mind now, and I will mention it because it may appeal to all of you, and that is the steel for the blades of safety razors. That steel goes through as many as twenty operations before it leaves our plant, every operation requiring a skilled man, one who has spent years at his particular branch of the business and as a consequence commands a pretty fair day's wage.

SENATOR SIMMONS: You cannot measure the price of your product by the ton, can you?

MR. RAMSEY: Oh, yes.

SENATOR SIMMONS: What do you get for it a ton?

MR. RAMSEY: We get all the way from $120 to $2,500 a ton.

SENATOR SIMMONS: Can you tell the committee the amount of imports of your product into this country last year?

MR. RAMSEY: The amount of imports of high speed steel was from 1500 to 2000 tons out of a total consumption of about 6000 tons. For the amount of imports of the other grades I would have to consult the Government reports. I cannot tell you exactly.

SENATOR SIMMONS: What is the annual consumption of the things you manufacture?

MR. RAMSEY: We manufacture 75,000 tons, and I would say there are 125,000 tons consumed.

SENATOR SIMMONS: So there are 50,000 tons imported.

MR. RAMSEY: You are right in your computation. We furnish 75,000 tons out of 125,000 tons.

SENATOR SIMMONS: Where does that which is imported come from?

MR. RAMSEY: It comes from England——

SENATOR SIMMONS: Altogether?

MR. RAMSEY: Largely. And Austria; some from Germany and a little bit from France, but not much; and some from Italy.

THE ACTING CHAIRMAN: Have you anything further to say?

MR. RAMSEY: This production of 75,000 tons a year represents a great deal to the American manufacturers. We have about 20,000 working men, with their families dependent upon them, and unless we have proper protection on our product the foreign manufacturer, with his cheaper labor and his cheaper raw material, puts us on the defensive. If we are obliged to economize there is only one way, and that is to bring our $4 laboring man down as closely as we can to our foreign competitor's men. I hope this committee will see its way clear to prevent that.

The Roller Bearing Industry

Statement of Robert S. Woodward, Representing the Standard Roller Bearing Company, Philadelphia, Pa., and Others

MR. WOODWARD: The manufacture of steel balls, ball bearings and roller bearings in this country is of very recent development, for, previous to the advent of the motor car, the industry was so small as to be practically negligible. We can say, therefore, that any consideration of the subject is a matter of the past six years, and that the products are integral parts of the motor car.

There is at present invested in this country in this line of business about $9,000,000, and the various manufacturers employ collectively between 5000 and 6000 people, 95 per cent. of whom are adult males.

The industry as a whole may be called the manufacture of anti-friction bearings. There are several different types of such bearings, all having special characteristics of their own, but so far as the use of one type or another is concerned, they all perform the same general functions and enter into competition one with the other; hence they should be considered collectively so far as any general argument is concerned.

The manufacture of anti-friction bearings requires the highest development of scientific handling of both labor and material, and there are factors entering into this industry which are applicable to no others.

Of the total amount of capital employed at least 35 per cent. is invested in special apparatus, meaning by that term special equipment of plants and special machinery and stock, all of which, or about $3,000,000, would in the event of liquidation be almost worthless.

The Extent of the Trade

The total domestic consumption of anti-friction bearings is estimated at between $8,500,000 and $9,000,000, this being approximately the average for the years 1910 and 1911. Of this total $2,500,000 represents the sale of imported bearings at American sales prices.

It will be seen, therefore, that under the present duty of 45 per cent. the American manufacturer has approximately only two-thirds of the home market and his foreign competitor one-third, and that foreign competition is not a future possibility should the tariff be reduced, but is already an accomplished fact under the present tariff; for no contract of any magnitude is awarded without several of the large foreign manufacturers, German in particular, being represented.

Under such conditions, and handicapped as we are by our much higher scale of wages than that of our foreign competitors, and being compelled to meet their continued reductions in sales prices, we view with uncertainty the future of our business, and feel that unless we are fully protected the entire field will be absorbed by foreign competition, resulting in the loss of our business and a considerable portion of our invested capital.

Our present profits have in most instances been absorbed by development and experimental work and the large depreciation on special equipment incident to a new and intricate industry of this character; and it can be stated that the domestic manufacturers taken as a whole have been unable to withdraw any appreciable profits from the business, all having been put back into the business with a hope to the further development thereof. Any change in our present relation to foreign competition affects the stability of our business in the future and jeopardizes several years' returns on the capital already invested, which capital we were led to invest on the basis of the present tariff rate.

A Lower Duty Would Be Disastrous

The suggested reduction in tariff rate would make it possible for the foreign manufacturer to reduce his price in this country about 15 per cent., and it would be impossible for the American manufacturer to meet this reduction and continue business.

No reduction in the steel schedule will affect the price on our raw material to any appreciable amount, for the reason that the materials used in the manufacture of anti-friction bearings are of an entirely different nature from those required in the ordinary mechanical arts. They are known in general as alloy steel, are purchased in comparatively small quantities, are of special analysis, and in many instances of special size and do not exceed 15 per cent. of the total cost of the product. It will thus be seen that a reduction upon raw material would have little or no effect.

The labor cost is the large factor in the total cost of manufacture. The average cost of the various kinds of material used in our products varies from 8 to 10 cents per lb. From the very nature of our product, requiring as it does the most extreme accuracy and the greatest amount of care, we are compelled to employ only the most intelligent class, which is at all times scarce and difficult to obtain, still further handicapping us as compared with our foreign competition. There is nothing that we know of in the mechanical arts at the present time that must be produced with anything like the same degree of care and accuracy, both as to labor and material, as the anti-friction bearing. A variation in a bearing in excess of 2½ ten-thousandths of an inch either way necessitates the discarding of that bearing for any commercial use.

This extreme accuracy requires, therefore, the most careful and scientific methods in the handling of both labor and material; and the proportion of cost of the labor required in the manufacture of this product is a very large part of the total cost as compared with other lines of industry. This operates strongly against us, more so we believe than in any other line of metal product, and entitles us to your very full consideration.

It is known by those most familiar with labor costs that they are much greater here than abroad, being at least 2 1/3 times more in the United States than in Germany—from which country comes the majority of imported bearings—and about twice as much as in England.

Summary of Reasons for Maintaining Duties

We ask, therefore, a continuation of the present rate to enable us to continue the development of this industry, and we base our argument specifically upon the following grounds:

1. Our labor costs are from 2 to 2 1/3 times that of our foreign competitors.

2. The advantage accruing to us by any reduction in the cost of raw material will be absolutely negligible, and there are considerable classes of material entering into the maintenance of our business which will not be affected whatsoever.

3. The best possible evidence of our inability to stand any reduction is that one-third of the total American consumption is even now in the hands of foreign manufacturers, and that unless we are properly protected the entire business is likely to pass to them.

4. That in the manufacture of anti-friction bearings we can only use intelligent and exceptionally high-grade labor, and further that the percentage of that labor entering into our costs is a larger factor than in almost any other industry.

5. That the industry being of such recent development, we have had as yet no adequate returns.

6. That the difference between our cost of production and the selling price is so small as to make it impossible for us, in the event of the proposed reduction in duty going into effect, to share further the home market with the foreign manufacturers.

7. The foreign manufacturers—of whom but three were represented in this country two years ago, whereas now more than 12 find this an attractive market—supply one-third of the American demand and at a satisfactory profit, or the trade would not continue, without the maintenance of any plant or equipment whatsoever, and without employing a single dollar's worth of American labor or the use of a single dollar's worth of American material.

SENATOR JOHNSON: What is the percentage of the labor cost of this article?

MR. WOODWARD: It is about 60 to 70 per cent.

SENATOR JOHNSON: Have you been able to supply the demand of home manufacturers in this country?

MR. WOODWARD: We could supply the demand if we could get the business.

SENATOR JOHNSON: How many concerns manufacture these anti-friction balls in this country?

MR. WOODWARD: About five or six. There are four represented here.

SENATOR JOHNSON: Where are they located?

MR. WOODWARD: The New Departure Company, Bristol, Conn.; Standard Roller Bearing Company, Philadelphia, Pa.; Hyatt Roller Bearing Company, Newark, N. J.; Timken Roller Bearing Company, Canton, Ohio. Then there is a smaller manufacturer at Buffalo, and I do not recall where the other one is. He is very small.

SENATOR SIMMONS: In the tables furnished in the report of the House Committee I find this statement: That the value of the imports of anti-friction balls in 1910 was $1,326,922, and in 1911 $1,083,894. So, according to that, it would not be much more than one-ninth of the whole.

MR. WOODWARD: That is the price abroad—the price in Germany. You must add to that 45 per cent. duty; you must add from 5 to 6 per cent. carriage and insurance across the water; then you must add the selling cost in this country, the cost of advertising, the cost of warehousing these goods; and the fact of the matter is that they are sold in this country at about twice that figure.

SENATOR SIMMONS: When you mentioned $9,000,000 as the total output, did you include in that the selling cost and everything?

MR. WOODWARD: Yes.

Difficulties Encountered in Manufacturing

SENATOR SIMMONS: Do they manufacture a similar article in England?

MR. WOODWARD: It is almost exactly the same thing. I might say to you that four years ago we had to educate two of the best steel makers in this country to make a steel that would do this work. They did not make it. They did not know how to make it. We had to send our own metallurgist into their mills and let him stay there until they did just what we wanted done.

After getting the right steel, it is useless until it is properly heat-treated. If you raise its temperature perhaps to 1400 deg. and then cool it, you might better have cast iron. If you raise it to 1425 or 1450 deg. and then cool it properly, it is the finest metal that ever has been made. If you had raised it to 1550 deg. you would have spoiled it again. In other words, it has to be handled most carefully. All of our treatment furnaces are very carefully pyrometered, so that we know exactly what the temperatures are; and it is impossible to make that product unless you do that.

The accuracy required in those steel balls is greater than I was mentioning. Those balls vary less in the various diameters, and in sets of the various balls, than one-tenth of a thousandth of an inch. I have a report here from Dr. Stratton, of the Bureau of Standards, who examined some balls for us and measured them. He says: "The above figures are correct to [not four-tenths of a thousandth, but to] four-hundredths of a thousandth of an inch for the absolute diameters, and to two-one-hundredths for the range of diameters of single balls. Summarized, from the measurements made, all the balls seem to be spherical well within one-tenth of a thousandth of an inch [the previous figures show it is about half that], and most of them are so within five-one-hundredths of a thousandth of an inch."

This is an industry that is new, gentlemen. It was developed in Germany. We are following as fast as we can. If we can have the same protection we have now for a number of years we can develop this business and keep it.

The Manufacture of Pliers and Nippers

At the hearing on February 24 representatives of manufacturers of pliers and nippers presented their case. Extracts from the testimony then elicited are as follows:

Statement of Arthur A. Kraeuter, of Newark, N. J., Representing Kraeuter & Co.

MR. KRAEUTER: I am the president of Kraeuter & Co., who for the past 52 years have been manufacturing pliers and nippers. For 20 years I myself have hired labor for this business, and I feel that in a very few words I can point out to you that it would be very unjust to the American manufacturers and employees to change the present duty on pliers and nippers.

SENATOR CLARK: The proposal is to reduce it to 30 per cent.?

MR. KRAEUTER: Yes, sir. In this line of business we do not have any automatic machinery, and no parts of these pliers or nippers are made on automatic machines except the rivets; consequently, 98 per cent.—yes, 99 per cent.—is hand labor. The few machines that are employed in the manufacture of this line are very simple, and they are the same that have been in use for the last 40 or 50 years. So it is altogether a matter of labor. In fact, the present tariff is not sufficient.

English and American Wages Compared

In support of this I submit the subjoined wage scale in England, in comparison with our American wage scale. The English wage scale is given on authority of George Bennett, formerly of Leeds, England, now superintendent of Kraeuter & Co., being the rates which he was paying in England in 1910 for the same work and same number of hours, while directing a business of a similar nature and also acting as superintendent, and is as follows:

Minimum Wage Table

	America. Minimum wage per week	England. Minimum wage per week	American excess over England per week
Die sinkers	$24.00	$7.50	$16.50
Tool makers	20.00	7.00	13.00
Forgers	24.00	10.00	14.00
Bench workers	12.00	5.00	7.00
Polishers	15.00	5.00	10.00
Laborers	9.00	3.00	6.00
Boys	6.00	2.00	4.00

Maximum Wage Table

Die sinkers	$30.00	$17.50	$12.50
Tool makers	28.00	10.00	18.00
Forgers	30.00	12.00	18.00
Bench workers	18.00	7.00	11.00
Polishers	18.00	8.00	10.00
Laborers	12.00	5.00	7.00
Boys	6.00	3.00	3.00

The following wage-scale in Germany for the same work and same number of hours is given on the authority of a tool and die maker, a bench worker and a grinder in my employ, all of whom have come from Germany in the past two years:

Minimum Wage Table

	America. Minimum wage per week	Germany. Minimum wage per week	American excess over Germany per week
Die sinkers	$24.00	$10.00	$14.00
Tool makers	20.00	10.00	10.00
Forgers	24.00	9.00	15.00
Bench workers	12.00	6.00	6.00
Polishers	15.00	6.00	9.00
Laborers	9.00	5.00	4.00
Boys	6.00	3.00	3.00

Maximum Wage Table

Die sinkers	$30.00	$12.00	$18.00
Tool makers	28.00	12.00	16.00
Forgers	30.00	10.50	19.50
Bench workers	18.00	8.00	10.00
Polishers	18.00	8.00	10.00
Laborers	12.00	7.00	5.00
Boys	9.00	3.00	6.00

Boys serve seven years' apprenticeship in England. The first year they do not receive any pay, the second year $2 per week, and every year thereafter a raise of 25 cents per week, giving them 3.25 per week the last year of service. The same applies in Germany.

In addition to the low rate paid, there are thousands of boys and girls in Germany, children from seven years old and up, who work at home from the time they get up in the morning until school time, and from the time they return from school until bedtime.

The following table shows a comparison in cost on our tool No. 356—6 in., a duplicate of the Billings & Spencer slip joint combination plier, largely used by automobilists, and which in its varying styles is made in very large numbers in this country, giving labor costs only and not including any charge for use of dies or overhead expenses:

Labor Costs of No. 356 6-in. Plier, per 100 Pieces, or 50 Tools, in America and England

	55-hour rate	Cost in America	55-hour rate	Cost in England
Forging	$0.40	$0.38	$0.22	$0.21
Trimming	0.20	0.08	0.12½	0.05
Reforging	0.40	0.11	0.22	0.06
Second trimming	0.20	0.04	0.12½	0.02½
Drilling	0.15	0.12	0.09	0.07 1/5
Milling	0.15	0.25	0.09	0.15
Punching	0.20	0.06	0.12½	0.03¾
Reaming	0.15	0.05	0.09	0.03
Drifting	0.15	0.03	0.09	0.01 8/10
Boy—coarse polishing burrs	0.12	0.16	0.07½	0.09 2/3
Man—coarse polishing handle	0.28	0.84	0.14½	0.44
Grinding and coarse polishing flats	0.28	1.00	0.14½	0.58
Grinding and coarse polishing screw drivers	0.28	0.21	0.14½	0.11½
Hardening	0.25	0.10¼	0.16⅔	0 06 7/10
Polishing screw driver	0.28	0.10½	0.14½	0 06
Polishing joint handle flat	0.28	1.36	0.14½	0.70
Polishing flat fine	0.28	0.20	0.14½	0.11½
Assembling	0.15	0.25	0.09	0.15
Polishing tips	0.28	0.25	0.14½	0.13½
Brushing	0.28	0.25	0.14½	0.13½
Boy cleaning	0.08⅓	0.09½	0.03⅜	0.04⅜
Nickel plating	0.30	0.33⅓	0.14½	0.15 1/10
Setting	0.15	0.13	0.09	0.07 8/10
Coloring buff wheel	0.28⅓	0.75	0.14½	0.37
Cleaning	0.08⅓	0.06	0.03⅜	0.03
Wiping boxing	0.08⅓	0.10	0.03⅜	0.05
Total		$7.31 7/12		$3.97 11/60

Note that there are 26 separate operations requiring handling and skilled labor.

German figures are still more disadvantageous to American workmen.

Further Wage Comparisons

American ingenuity and American labor-saving machinery have not yet enabled Americans to surpass in the volume of product in the same operations of single pieces produced by our American wage-earners over the single piece produced by our competitors in England or Germany, at their lower wage scale, in the production of our line of nippers and pliers. In support of this statement we submit the following facts:

In November, 1910, Kraeuter & Co. engaged Fred Williams of England, who had landed in this country two weeks before and applied to us for employment as a polisher. He stated to us before being employed that he had earned as much as $8 to $9 per week in American money while engaged in his trade in England. We engaged him and in the first week he earned, under his new and strange conditions, $15.25 for his week's work. He is now earning $17 a week on time work.

From Germany we have a man, Fred Flemm, who commenced his trade in Germany as a grinder at seven years of age, who stated that the most he ever made at his trade was 11.50 in American money. He was employed by us in July, 1910, on his arrival from Germany, and his first week's wages was about $17. He now earns $20 a week.

Polishing and grinding are one-fourth of our pay roll, and the volume of product per day of nippers and pliers is gauged in each country by the number of employees in this department.

We have five die-sinkers, and there is only one that gets $24 a week, the rest getting $27 and $30 a week. Recently I needed another die-sinker, and I wanted to get one for 24 a week, and I spent $27 in advertising in newspapers in several cities and still did not get the die-sinker. So I changed the advertisement and made it read $27 a week, and after a lapse of several days I got the die-sinker. So we are not paying a premium rate.

Tool makers in America get from $20 to $28. In England they get from $7 to $10, and in Germany from $10 to $12.

Forgers in America get from 24 to $30. In England they get from $10 to $12, and in Germany from $9 to $10.50.

I have at the present time a forger who went back home visiting last summer. His name is Pearson. I asked him a week or two ago what men would get on his hammer, which is an 800-lb. He said they would get from $8 to $12 a week. He is getting $26 per week.

We pay laborers from $9 to $12 per week; in England they get from $3 to $5, and in Germany from $5 to $7. We pay all our boys from $6 to $9; in England they get $2, and in Germany $3. The boy proposition in Germany is a very serious one. The boys work at home from the time they get up in the morning until they go to school, and after school lets out until bedtime. The whole family is working at home.

SENATOR CLARK: The work is carried on outside of the factory?

MR. KRAEUTER: Yes. Most of the work on pliers is done with a file and a hammer. I should say three-fourths of the work can be done in the home.

SENATOR CLARK: Do you do any of it in that way?

MR. KRAEUTER: No.

SENATOR CLARK: You do it all in the factory?

MR. KRAEUTER: Yes.

Statement of W. Pierrepont White, President of the Utica Drop Forge & Tool Company, Utica, N. Y.

MR. WHITE: This tool which I hold in my hand is an English plier, known as our No. 50 line, and is retailed all over the United States at 90 cents. Six years ago these pliers would have been retailed at a varying price, just as razors have been heretofore, from $1.25 to $2.50, according to the distance from the supply and the necessities of the purchaser, as exacted from him by the retailer. We have standardized these goods, standardized the consumer's price, published the consumer's price throughout the entire United States, pay the freight to the point of consumption on lots exceeding 150 lb., and are making a tool in competition with the foreign made article.

We have been in this business for 15 years, and in that time we have increased our pay roll, which in 1902 was, in round numbers, $55,000, up to a pay roll which will come, in 1912, to $93,000. The net return to the factory per tool in 1902 was 49½ cents; last year it was 27 1/3 cents. Competition in this country among the domestic manufacturers and the competition from abroad are carrying this line of products lower than they have ever been sold before in this country.

SENATOR CLARK: How about the cost of manufacture; is that lower?

MR. WHITE: We were burned out in 1908. If we had not been burned out we could not have got the cost down. We were enabled, through that fire, to replace our entire factory on good lines, and we are still struggling with that cost of manufacture. We have not been able to introduce machinery in our operations in places where we can compete with the labor on the Continent. I therefore ask that no change be made in the present tariff.

SENATOR SMOOT: Let me ask you, since the increase in the Payne-Aldrich act that was granted to manufacturers of nippers and pliers, has the price of those articles advanced in this country?

MR. WHITE: No, sir.

SENATOR SMOOT: Has it declined?

MR. WHITE: Prices have to us at the factory, net.

SENATOR SMOOT: That is through American competition?

MR. WHITE: Yes, sir.

SENATOR SMOOT: Are there any combinations between the manufacturers of nippers and pliers in this country?

MR. WHITE: No, sir.

SENATOR SMOOT: No agreement as to prices?

MR. WHITE: No, sir.

How Prices Have Declined

Mr. White submitted the following statement as part of his testimony:

We desire no change made in the present tariff, as the conditions are substantially the same as presented to the

Senate Finance Committee in 1909, at the time of the passage of the Payne-Aldrich tariff act, and to which statements so made reference is hereby made for the purpose of incorporating them into the records of this hearing.

The following statement of increasing pay rolls with increased employment for those desiring it, which at the same time bring to the consumer a decreased price per tool, shows the correct working of a tariff and the creation of proper domestic competition:

Payroll of the Utica Drop Forge & Tool Company, for 11 years and average net price per tool to the factory for 10 years.

Year	Payroll	Net average return to factory per tool.
1902	$54,987.79	49½c.
1903	54,371.81	40⅛c.
1904	43,664.59	49½c.
1905	40,961.23	42½c.
1906	49,888.65	34c.
1907	49,051.23	34c.
1908	49,918.60	30½c.
1909	73,302.50	29¾c.
1910	84,088.40	26c.
1911	85,712.83	27½c.
1912	93,600.00*	

*Estimated 10 per cent. over 1911.

This table shows an increase of 70.22 per cent. in the pay roll and a decrease of 44.79 per cent. on the average price received per tool.

Statement of G. N. Jacobi, Sales Manager of the Peck, Stow & Wilcox Company, New Haven, Conn.

MR. JACOBI: I cannot give you any costs as to the detailed part of the manufacture. I have got the costs only of the completed article as it comes to me from the factory. We are extensive manufacturers of pliers and nippers. The present tariff enables us to market in this country certain kinds of pliers which are in considerable demand and which make up a large proportion of our entire output of pliers. These goods are sold close to cost, as comparable foreign goods can today be imported at the same or at a lower price than the American goods can be manufactured for. The importations, however, are light, as the American article is preferred even at a slight advance in price. This is for the reason that American manufacturers can make prompt deliveries. The merchant is not compelled to carry a large stock and orders placed with the American manufacturer are not subject to the same delays and disappointments as those placed abroad. The American mechanic also prefers the American-made goods if not compelled to pay too much of an advance in price.

Should the proposed tariff go into effect it would establish too great a differential for the American manufacturer to overcome, and I feel sure that the total production of American-made pliers would be reduced to a very large extent.

Our company, therefore, asks that the present tariff rate be not reduced, as it would surely mean a considerable loss of volume of business and consequent increase in cost of manufacture; goods can only be manufactured at a minimum of cost if production is up to the maximum of the producing capacity of the factory. Our workmen would also suffer on account of this loss of business, their earning capacity being reduced in proportion to the number of hours they are compelled to be idle.

The pliers I am referring to particularly are the medium grade side-cutting pliers and the medium grade button pliers. That line is probably one-third to one-half of our total production. This is forged steel goods. I am not talking about the cast steel, because they are not made in this country. The side-cutting plier, 6-in., weighs 5 lb. to the dozen. The importer's price is approximately $2.59 a dozen. This would make the price on the other side approximately $1.57. To make up the $2.59 you would take the 40 per cent. duty, which is 63 cents a dozen, and 8 cents a lb., 40 cents, making the pliers cost on the other side $2.60. The new rate, based on the $1.57, with 30 per cent. added, would make it $1.94. These pliers cost us in this country to manufacture $2.45.

Protest from Razor Manufacturers

H. L. Henry, Bridgeport, Conn., secretary and treasurer of the Geneva Cutlery Company, appeared in behalf of that company and several other manufacturers of razors. He said that the razor industry in the United States is in no combination; also that there has never been sufficient protection to enable American manufacturers to produce and sell as many razors as were imported each year. Under the Payne tariff act the importations of razors in 1910 were $305,657; in 1911, $375,835. The estimated importations for 12 months under the proposed Underwood bill—an estimate made by the Ways and Means Committee itself—are $800,000, which would be an increase of $424,165 over the year 1911, whereas the entire production of all razor manufacturers in the United States has not yet reached the sum of $400,000 in a year. On this basis the razor industry of the United States is wiped out of existence. Mr. Henry exhibited imported German razors and with them a number of American razors. The No. 1 razor which he showed was made in Germany and is laid down in this country at 99.96 cents a dozen. No razor can be made to compete with it in this country. The No. 2 German razor shown is delivered here at $1.50 a dozen. A corresponding American razor costs $2.60 a dozen at the factory. No. 3 German razor is landed here at slightly under $2. The cost of American razor No. 3 is $3.55 a dozen. For German razor No. 4 and American razor No. 4 the figures are respectively $3 and $4.84 a dozen; on the No. 5 razors the figures are $3.28 and $6.02 respectively. Mr. Henry stated that there are seven concerns in the United States making razors, most of them also making pocket knives; only two make razors alone.

A statement for the razor industry was also made by William Turner, president of the J. R. Torrey Razor Company, Worcester, Mass. Referring to German razor No. 2 exhibited to the committee Mr. Turner said that while it is laid down in this country at 6 marks 30 pfennigs, or $1.499 per dozen, the cheapest price at which it could be produced at his factory is $2.60.

Statement of George M. Wright, of the Wright Wire Company, Worcester, Mass.

Mr. Wright protested against placing on the free list a product of very fine wire known as poultry and rabbit fencing. He made the following points:

1. There is a great difference in labor value between barb wire, fence wire (in coils) or wire nails on the one hand and woven wire fencing, especially poultry and rabbit netting and fencing, on the other hand. Nearly all the latter is woven from No. 14 gauge wire and finer down to No. 20 gauge wire. While barb wire carries an advance cost of $8 to $10 a ton over the wire rod, poultry and rabbit fencing and netting carry an advance cost of $60 to $100 a ton over the wire rod, the difference being made up to a large degree by the extra cost of labor.

2. The protection on fencing is swept aside while the raw material, wire rods and weaving wire carry 10 per cent. and 20 per cent. ad valorem respectively.

3. Poultry and rabbit netting and fencing, costing 100 to 150 per cent. more than the wire rod it is drawn from, is woven on expensive machinery costing 50 per cent. more than in England or Germany, while the wages paid are from 80 to 125 per cent. more than on the other side.

4. The present 40 per cent. tariff is insufficient to cover the difference in cost in the United States and England on some few selected sizes, and at least an average of 35 per cent. is required to protect the whole list.

5. English and German manufacturers have had for 20 years an immense business from Australia and New Zealand, none of which the United States can get because of much higher wage costs in this country.

6. The cost of business is greater in the United States than in Europe, and there is but one season a year in which to market goods here—from January to May—so that expensive warehouse facilities have to be provided. The English and German manufacturers have the advantage of the Australian market, with an opposite season, so that they can run continuously the year round.

7. In this paragraph Mr. Wright emphasizes the injustice of placing on the free list a commodity averaging a cost of $100 a ton—47 per cent. material, 35 per cent. American labor, and 18 per cent. overhead and general expenses—while retaining a duty on raw material equal to 10 per cent. on the wire rods and 20 per cent on the wire.

Protest from the Wood Screw Industry

Olney Arnold, representing the Rogers Screw Company, Providence, R. I., appeared for the wood screw industry, in which there are about 25 plants in the United States. About 50 per cent. more screws can be produced in this country than can be consumed by the domestic trade. The Underwood bill contemplates an ad valorem duty of but 25 per cent., while the raw material, wire, is taxed 20 per cent. Mr. Arnold spoke of the danger of wiping out the industry in the United States in view of the very low cost of the German screw makers. If specific rates of duty are to be abandoned, he considered that the screw manufacturers of the United States are fairly entitled to either free raw material, with 35 per cent. ad valorem duty on wood screws, or if a duty on the raw material, wire, is retained, that the screw manufacturers should be given a compensating duty.

Will Make Screw Machine Products

The Babson-Dow Company, Boston, to Establish Large Works at Jamaica Plain

The Babson-Dow Mfg. Company, 79 Milk street, Boston, Mass., has been organized to manufacture a complete line of screw machine products. A factory building will be erected at Jamaica Plain, a suburb of the city. The building will be 60 x 250 ft., four stories and basement, and the architect's plans call for walls having a maximum window area. J. Payson Bradley is the president; John McGregor, first vice-president; H. F. Dow, second vice-president and superintendent; R. M. Currier, treasurer, and Roger D. Babson, general manager. The board of directors consists of these officers and William P. Fowler and L. J. Brackett.

General Manager Babson was formerly with the Billings & Spencer Company and the Whitlock Coil Pipe Company, Hartford, Conn., and for the last three years has been the Boston representative of the Hartford Machine Screw Company. Mr. Dow has been for 15 years superintendent of the screw machine department of the United Shoe Machinery Company, Beverly, Mass., and before that time was with the Pratt & Whitney Company, Hartford, for six years. Mr. Fowler is chairman of the Board of Charities of Boston, and is a director of the Boston & Revere Rubber Company. The other members of the board are prominently connected with business and financial undertakings in Boston and vicinity.

The company has an authorized capital stock of $450,000 and is a Massachusetts corporation. It will in the beginning occupy 20,000 sq. ft. of the new factory building, the other tenants of which will be the Randall-Faichney Company, Boston, manufacturer of surgical instruments, and the MacKae Mfg. Company, Boston, manufacturer of automobile accessories.

The Babson-Dow Company will have a plant completely equipped for the manufacture of screw machine products from 0.016 to 4½-in. diameter. There will be case hardening, grinding and nickel plating departments and a fully equipped machine shop. To enumerate more completely the proposed products, they will include set screws, cap screws, machine screws, taper pins, thumb screws, studs and pins, sewing machine bobbins and screws; parts for scientific instruments, guns, watches, clocks, optical instruments, electrical goods, cameras, adding machines, typewriters, taxi-meters and automobiles; and all articles turned from gold, silver, platinum, brass, bronze, iron or steel wire. The company will also build machine tools. The factory will be ready for operation July 1. The equipment is now being purchased. No power plant will be installed, the purpose being to purchase electric power from outside.

Steel Corporation's Answer Regarding Destruction of Records

The answer to the Federal Government's petition for a permanent injunction to prevent the destruction of books and papers which might be used as evidence in investigation of the affairs of the United States Steel Corporation has been made public. The corporation denies that papers of the American Steel & Wire Company which were destroyed last fall would have shown that J. A. Farrell, now president of the United States Steel Corporation, aided or abetted in the operation of the so-called wire pool. It disclaims any attempt to conceal or suppress from the Government any papers or documents bearing upon the conduct of the steel business, and declares absolutely without ground the "imputation" to the effect that any of the defendants to the Government suit are about to destroy or are likely to destroy pertinent papers, or that an injunction is necessary for their preservation.

The answer explains that the destruction of papers mentioned occurred after all the papers had been submitted to the grand jury and was due to ignorance of the possibility that they would be wanted further by the Government.

The Associated Foundry Foremen of Philadelphia will meet on the evening of March 12 at Park Avenue Hall, 1315 Columbia avenue, in room D. F. M. Bowers, Chester, Pa., will speak on "The Electric Welder in the Foundry."

Baltimore Industrial Notes

BALTIMORE, MD., March 4, 1912.

The Chesapeake Iron Works is but moderately engaged, recent orders being confined to small projects. The estimating department is fairly busy on prospective work, both in this vicinity and in the South, and it is believed that with the opening of the spring season more active conditions will prevail.

The Carnegie Steel Company Baltimore Warehouse is the title given the local branch of the Carnegie Steel Company, which several months ago acquired the plant of the Baltimore Bridge Company. H. D. Bush, formerly vice-president and general manager of the Baltimore Bridge Company, is in charge as general superintendent of the new business. While no definite information is available, it is stated that a large warehouse will be erected at an early date, plans for which are now under consideration.

The Baltimore Bridge Company, which recently sold its plant to the Carnegie Steel Company, will, it is stated, discontinue its business after the completion of the orders now in hand.

Oliver Reeder & Son will erect a brick warehouse 47 x 63 ft. at Hughes and Covington streets. The building will be used for the storage of shipbuilders' supplies, no machinery being required.

Riggs, Dissler & Stringer, engineers, report February a very quiet month, but considerable business is being estimated upon, particularly in the way of engine work.

Among some of the important propositions in the South being figured on by local contractors and fabricators is an addition to Murphy's Hotel, Richmond, involving about 3000 tons of structural work, a new theater in the same city and a building for the Union National Bank, Columbia, S. C., which will require about 800 tons.

The Patapsco Iron Works reports a fair run of new business, mainly in small orders. It has recently installed considerable machinery and is now in a position to take care of a materially increased business.

Detrich Brothers have taken orders for several buildings, including a new bottling plant for the G. B. S. Brewing Company and a building for the Towson National Bank, Towson, Md. The bulk of the business offered is small, ranging from 10 to 100 tons. The award for an addition to the Baltimore Polytechnic Institute, about 600 tons, while not formally announced, will probably go to this firm.

Crook, Kries & Co. will install two 250-hp. four-valve Ball engines in the Monumental Brewery, high pressure pumping machinery for the elevator service at the Hotel Rennert and a new fan ventilating system in one of the departments of the Belvidere Hotel. Additional contracts for power piping and for equipment for the high pressure fire line pumping station for the city of Baltimore have also been taken.

John B. Adt has been operating overtime since the first of the year. Considerable additional machinery has been recently installed to meet the extra demand. Among recent orders taken are a number of special tobacco working machines for shipment to the South and West. An order for a large grain drying outfit for a local brewery has been booked, as has also considerable business in pipe, including special power plant pipe work. Recent exports include special tobacco machinery and a grain drying outfit.

The T. C. Bashor Company notes a slackening in orders in February, but various departments of the plant have been actively engaged, some operating overtime. A large amount of business is still on the books and some comparatively good orders have been taken for tank and pipe work for the United States Asphalt Refining Company, Curtis Bay, Md. It will install two Troy engines in the new plant of the Terminal Freezing & Heating Company and has considerable work for the Johns Hopkins Hospital.

A 500,000-volt testing transformer for making insulation tests on high-voltage transformers and other high-tension apparatus has recently been built by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. One of the special features of its design is an ingenious handling of the insulation problem. In tests the windings have, it is stated, developed a voltage of 600,000 without any sign of distress.

Trade Publications

Calendar.—The Newman Machine Company, Greensboro, N. C. Wall hanger measuring 14x20 in. Views of the company's plant and its line of woodworking machinery are shown in the upper portion of the hanger, which is designed to represent a section of a tree trunk, and the lettering and the border around the engravings are composed of twigs.

Lathes.—The R. K. Le Blond Machine Tool Company, Cincinnati, Ohio. Catalogue. Size, 6 x 9 in.; pages, 143. Concerned with the line of lathes which are built by this company in various styles. These include 14 different types and after a general description of the heavy duty lathe each is taken up and briefly illustrated and described. The various attachments furnished are illustrated and space is given to the plain and universal milling machines of this company.

Pneumatic Boiler Scaler.—Thos. H. Dallett Company, York and Twenty-third streets, Philadelphia, Pa. Bulletin No. 301. Devoted to a pneumatic boiler scaler which is a pneumatic hammer striking about 300 light and uniform blows a minute. This tool is said to remove the hardest scale right down to the boiler sheet and will not cut it, the scale being cracked from the boiler shell by the vibration caused by the hammer striking the plate rather than being cut away. Exterior and sectional views, together with engravings showing the scaler in use, are given. Mention is also made of the various types of hose which can be supplied for use with the scaler.

Air Compressor.—Ingersoll-Rand Company, 11 Broadway, New York. Form No. 3109. Is a 12-page bulletin descriptive of the class NF1 steam-driven single-stage, straight-line air compressors which are of the twin fly-wheel, center-crank, inclosed type with the steam and air cylinders arranged in tandem. Several views of the machine in sections are shown and tables of cylinder diameters, capacities and dimensions are also given. The air inlet valves on the smaller machines are of the direct-lift type and Hurricane inlet valves are used on the larger machines. The discharge valves on all the compressors are of the cushioned direct-lift type. The capacity of these compressors ranges from 42 to 627 cu. ft. per minute.

Boilers.—The Walsh & Weidner Boiler Company, Chattanooga, Tenn. Four loose leaf circulars. Show the company's standard and Dutch oven steel casings and front and sectional elevations of its all steel water tube boiler. The advantages of each are briefly given below the engravings.

Calendar.—Portsmouth Steel Company, Portsmouth, Ohio. Calendar for 1912, on which a bird's-eye view of the company's entire plant is shown, together with a view of its 84-in. plate mill.

Calendar.—Milton Mfg. Company, Milton, Pa. Wall calendar for 1912 of unusually large size, giving in addition to the usual monthly sheets a view of the company's plant for the manufacture of cold punched and hot pressed nuts and refined bar iron.

Machine Shop Tools and Specialties.—The McCrosky Reamer Company, Meadville, Pa. Catalogue and price list No. 3. Gives general description and specifications for a line of high grade tools and specialties for the machine shop. The catalogue is divided into four sections which deal with adjustable reamers, Wizard chucks and collets, an expanding mandrel and the Searchlight universal lamp bracket. In the first two sections the various tools are described and illustrated, while the last two treat of an expanding mandrel which can be inserted or removed from the work without the use of sledges or an arbor press and a universal lamp bracket which is made in four styles for use on machine tools, benches, tables and desks and also for attachment to the floor, ceiling or bench. A list of users of these various articles is given and a comprehensive general index completes the catalogue.

Metal Packing.—France Packing Company, Tacony, Philadelphia, Pa. Pamphlet. Deals with a vanadium metal packing which is made in various types for all classes of service. The various styles of packings are illustrated and briefly described.

Blow-Off Valve.—Nelson Valve Company, Philadelphia, Pa. Pamphlet. Devoted to the company's blow-off valve, which is said to possess the advantages of being seatless and fool-proof. After a general description of the valve, which is guaranteed when made in iron for a working pressure of 300 lb. and for the severest possible service when made in steel, the various types are shown. These include both angle and straight-away valves with both iron and steel bodies. Tables of the dimensions of both types of valves are given together with a diagram showing the proper connections for each style.

Ball Bearings.—New Departure Mfg. Company, Bristol, Conn. Catalogue. Size, 6 x 9 in.; pages, 76. Is a treatise on the subject of ball bearings which has been prepared by the company's staff of engineers. Information of a technical character is given, and after a brief introduction the three types, the double row, which is a combined radial and thrust bearing; the single row, which is a radial bearing, and the radax, which is a radial and axial bearing, are taken up and described. After this there is an extended description of the process of manufacture supplemented by halftone engravings and this is followed by suggestions on the use of the bearings together with tables of dimensions of the various styles that can be furnished.

Roller Bearings.—Hyatt Roller Bearing Company, Newark, N. J. Section No. 604D. Illustrates and describes the application of the company's roller bearings to mine and industrial cars. Among the designs covered are the Lobdell tight and loose wheel equipments, the Watt-Hyatt roller bearing wheels and axles and the D-P roller bearing wheels. All of these are illustrated, and sectional views showing the parts of the various wheels are included.

Air Economizer.—Sterling Equipment Company, 939 Peoples Gas Building, Chicago, Ill. Folder. Treats of the savings effected in the cost of air compression by the use of the Sterling air economizer. The advantages of this economizer are briefly discussed, and there are halftone and line engravings showing the appearance and construction of the device. An illustrated description of the economizer appeared in *The Iron Age*, October 12, 1911.

Lathe Dog.—West Steel Casting Company, East Seventieth street, Cleveland, Ohio. Mailing card. Calls attention to its anti-accident protected lathe dog.

By-Product Coke Oven.—Coal Distillation Company, 1211 Singer Building, New York City. Pamphlet. Relates to the Collin by-product coke oven. After a brief historical introduction the construction of the oven is described at length with numerous halftone and line engravings. An illustrated description of this oven appeared in *The Iron Age*, August 4, 1911.

Mandrels.—Jaeger & Sword Mfg. Company, New London, Conn. Circular. Relates to the Roll Grip mandrels of this company, the use of which is said to effect considerable savings in the production cost of turning, grinding, polishing and facing work. The use of these mandrels results in the elimination of face plates, dogs or drivers and also tailstock spindles, except where the amount of stock is excessive and then these are used only to keep the mandrel from springing. Numerous pieces where this mandrel was employed are shown.

Wrenches.—Walworth Mfg. Company, Boston, Mass. Pamphlet. Relates to the Stillson wrench which has been manufactured by this company for over 40 years. A view of the wrench with the frame removed is given to show the way in which the strain on the wrench is taken by the upper and lower jaws and the nuts. As soon as the pressure on the handle is released the springs in the wrench throw the jaw back.

Water Tube Boiler.—Oil City Boiler Works, Oil City, Pa. Booklet. Deals with the Geary water tube boiler, which is of the box header type with inclined tubes and horizontal drums. The boiler is built in sizes from 30 to 650 hp., and a number of sizes have about the same capacity but are of different dimensions to meet the varied conditions of draft, fuel, furnaces and transportation. The design and construction of the boiler are discussed, and this is followed by a description of the setting and equipment. Halftone and line engravings of the various boilers are given and a partial list of users complete the booklet.

Steel Castings.—Penn Steel Castings & Machine Company, Chester, Pa. Set of desk blotters faced with a celluloid cover. Refers to the company's Penn's special cast steel and calls particular attention to its tensile strength, which ranges from 60,000 to 80,000 lb. Specimen castings are reproduced on the cover.

Recording Instruments.—Uehling Instrument Company, Passaic, N. J. Bulletin No. 102. Covers in condensed form the various types of recorders made by this company and the standard charts for use in connection with them. This line includes recorders for pressures up to 30 lb. per square inch, calibrated in either ounces, pounds or inches of water or mercury, recorders for light pressures and vacuums calibrated in inches of water, draft and differential gauges, vacuum gauges, revolution recorders, etc. The hydrostatic principle is employed in these instruments, and in this way the use of springs, levers and joint movements is avoided. Another advantage of the employment of this principle is that the scale can be open where readings are important and narrow where they are unimportant, an arrangement which utilizes the whole width of the chart for the important readings. In the type D recorder, which is a vacuum gauge for recording vacuums ranging from 20 to 30 or from 25 to 30 in. or any other desired range of similar length, the entire range is spread over a chart 8 in. in diameter.

Drilling Machines.—Taylor & Fenn Company, Hartford, Conn. Catalogue. Size, 6 x 9 in.; pages, 21. This is the company's 1912 catalogue describing and illustrating a line of manufacturers' drilling machines which are sufficiently rigid and powerful to drive high-speed drills to the limit of their endurance. These machines are built in four different types with from one to six spindles, and in some cases it is possible to remove one or more spindles from the multi-spindle machines if desired. The construction of these machines is taken up at length and a complete table of dimensions is included. Mention is also made of a sensitive drilling machine with a 3-ft. radial arm which was illustrated in *The Iron Age*, November 24, 1910.

Corliss Engines.—Murray Iron Works Company, Burlington, Iowa. Booklet. Presents views of a number of installations of the company's Corliss engine in lumber mill service. A number of testimonial letters are included in the booklet, which is very attractive in appearance.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET

VALIDITY OF CONTRACT TO ASSIGN FUTURE PATENTS.—An agreement by one to assign all his future inventions is not enforceable, but an agreement to assign future patents is, if the subject matter of the inventions is described and made definite. (Michigan Supreme Court, Zagelmeyer vs. Laughray Concrete Brick Company, 132 Northwestern Reporter, 1045.)

RIGHT TO EXCLUSIVE USE OF FORM OF WIRE MESH.—A manufacturer of wire glass is not entitled to exclusive use therein of wire of a particular mesh, if the form is not original with him and he has no patent thereon, since that would protect him against competition in unpatented articles. (New Jersey Court of Chancery, Mississippi Wire Glass Company vs. Continuous Glass Press Company, 81 Atlantic Reporter, 374.)

PREREQUISITES TO UNFAIR COMPETITION.—There can be no liability as for unfair competition on account of similarity in products in the absence of a showing of intent to defraud and that the resemblance is deceptive to buyers of such products. (United States Circuit Court, Middle District of Pennsylvania, T. B. Wood's Sons Company vs. Valley Iron Works, 191 Federal Reporter, 196.)

SCOPE OF TRAVELING SALESMAN'S AUTHORITY.—Ordinarily, in the absence of special authority, a traveling salesman has no authority to bind his house beyond the soliciting of orders for acceptance or rejection by the house. (Arkansas Supreme Court, Lee vs. Vaughan Seed Store, 141 Southwestern Reporter, 496.)

WHO MAY SUE CARRIER FOR INJURY TO GOODS IN TRANSIT.—When goods are sold on sample and for delivery at the buyer's place of business with the right of inspection there, title does not pass until such delivery, and hence the seller is the proper person to sue a railroad company to which the goods were delivered by the seller for transportation to the buyer for injury to the shipment in transit. (Massachusetts Supreme Judicial Court, P. Garvan vs. New York Central & Hudson River Railroad Company, 96 Northeastern Reporter, 717.)

CANCELLATION OF ORDER BY BUYER.—A letter received by a seller of goods, after he has shipped them under the contract of sale, cancelling the orders does not release the buyer from his duty to receive the shipment. (Nebraska Supreme Court, J. J. Armsby Company vs. Raymond Brothers-Clarke Company, 134 Northwestern Reporter 174.)

LIABILITY OF SELLER OF GOODS SOLD F. O. B. PLACE OF SHIPMENT.—A seller of goods f. o. b. place of shipment is not responsible for injury to them during transportation nor after their arrival at the destination. (Alabama Appellate Court, National Aniline & Chemical Company vs. National Chemical Company, 57 Southern Reporter 114.)

SALESMAN'S RIGHT TO COMMISSION.—A salesman's right to commissions on an accepted order cannot be defeated by subsequent modification of the contract of sale made without his consent. (New York Supreme Court, Fourth Appellate Division, Pancoast vs. Industrial Glass Company, 132 New York Supplement 821.)

INSUFFICIENT DEFENSE AGAINST SUIT FOR PRICE OF MACHINERY.—That machinery retained by the buyer is not adapted to the purpose for which it was sold is not a defense to an action for the price, unless it is valueless for any purpose. (Georgia Court of Appeals, Stimpson Specialty Company vs. Parker, 73 Southeastern Reporter 412.)

RECLAMATION OF MACHINERY SOLD CONDITIONALLY.—One who installed machinery in a manufacturing plant under agreement with the contractor who constructed the plant, reserving title until payment of the price, is entitled to reclaim the machinery from the trustee in bankruptcy of the owner of the plant, the owner having known of the reservation of title. (United States District Court for the District of Rhode Island, In re Great Lakes Engineering Works, 191 Federal Reporter 931.)

SCOPE OF BULK SALES LAW.—A statute which provides that the sale, trade or other disposition in bulk of any part or whole of a stock of merchandise, otherwise that in the ordinary course of trade and in the regular and usual prosecution of the seller's business, shall be void as against the creditors of the seller, unless certain conditions are compiled with, does not apply to fixtures or a manufacturer's stock of raw material. (Nebraska Supreme Court, Lee vs. Gillen & Honey, 124 Northwestern Reporter 278.)

CARRIER'S LIABILITY FOR FREIGHT BURNED.—A railroad company is liable for loss of freight burned after being loaded in a car standing on the company's switch-track and after issuance of an ordinary bill of lading. (Kentucky Court of Appeals, Cincinnati Grain Company vs. Louisville & Nashville Railroad Company, 142 Southwestern Reporter 374.)

AUTHORITY OF SALESMEN.—Authority in a salesman to sell implies authority to collect the price, in the absence of provision to the contrary. A selling agent can bind his principal by appointment of a sub-agent only when so authorized. (Springfield, Missouri Court of Appeals, Hodkinson vs. McNeal Machinery Company, 142 Southwestern Reporter 457.)

DAMAGE RECOVERABLE FOR DELAYING FREIGHT.—A railroad company's liability for delay in delivering freight does not extend to damages which, through want of notice to the company when the contract of carriage was made, could not be foreseen as a result of the delay; and notice given while the freight is in transit does not charge the carrier with liability as to delays thereafter accruing. (Texas Court of Civil Appeals, Rassler vs. Gulf, Colorado & Santa Fé Railway Company 142 Southwestern Reporter 629.)

PATENTEE'S RIGHT TO RESTRICT RETAIL PRICE.—A patentee is entitled to restrict the price at which the patented device shall be retailed. (United States Circuit Court, Southern District of New York, Waltham Watch Company vs. Keene, 191 Federal Reporter 855.)

POWER OF RECEIVER TO TERMINATE CONTRACT.—The receiver of an insolvent corporation may terminate contract made by the company employing a general manager for a fixed term. (Delaware Court of Chancery, DuPont vs. Standard Arms Company, 81 Atlantic Reporter 1089.)

NECESSITY FOR FILING LOST FREIGHT CLAIM.—Under a bill of lading which requires a claim for loss or delay of freight to be made in writing within a specified time, mere notice of loss to the company's agent at the destination is insufficient. (Arkansas Supreme Court, Williams vs. Chicago, Rock Island & Pacific Railway Company, 142 Southwestern Reporter 826.)

ENFORCEMENT OF EMPLOYERS' LIABILITY INSURANCE.—Unless an indemnity insurance company, in assuming the defense of an action against an employer for personal injury to a workman, expressly reserves the right to deny liability under the policy on account of such suit, it will be estopped to deny liability after failing in the defense. (Springfield, Missouri, Court of Appeals, Royale Mining Company vs. Fidelity & Casualty Company, 142 Southeastern Reporter 438.)

INJURY RECEIVED AFTER REGULAR WORKING HOURS.—An employer's liability for injury to a workman is not affected by the fact that accident occurred after regular working hours. (New York Supreme Court, Third Appellate Division, Gage vs. S. Mills Ely Company, 132 New York Supplement 953.)

LIABILITY FOR INJURY TO ORE UNLOADER.—A steel company whose ore unloaders on a dock were damaged by collision therewith by a boat using the dock cannot recover against the owners of the boat if the persons in charge thereof were not chargeable with notice that the unloaders projected beyond the face of the dock. (New York Supreme Court, Fourth Appellate Division, Lackawanna Steel Company vs. Pioneer Steamship Company, 132 New York Supplement 980.)

INJURY TO OPERATOR OF DERRICK.—In an action for injury to a 20-year-old laborer while attempting to lower a derrick load by operating a hand crank and a clutch, caused by his losing his hold on the crank after releasing the clutch, the jury was warranted in finding that the employer was negligent in putting him to work without instructing him as to the dangers incident to the work. (Minnesota Supreme Court, McDonough vs. Cameron, 134 Northwestern Reporter 118.)

ASSUMPTION OF RISK BY FOUNDRY EMPLOYEE.—An experienced cupola tender in a foundry assumed the risk of being burned by molten slag while letting it out of the cupola in a manner known to him to be dangerous. That the employer might have adopted a safer method for the doing of the work does not entitle workman to recover for injury received while knowingly encountering danger. (Kentucky Court of Appeals, Burch vs. Louisville Car Wheel & Railway Supply Company, 142 Southwestern Reporter 414.)

RIGHT TO ENJOIN ACTS OF LABOR UNIONISTS.—One engaged in business can maintain suit to enjoin members of a labor union and their sympathizers from congregating and parading before his place of business to drive away patrons or commit breaches of the peace, etc., on the theory that such acts constitute a nuisance. (Montana Supreme Court, Iverson vs. Dilno, 119 Pacific Reporter 719.)

EMPLOYER'S LIABILITY FOR EMPLOYEE'S ASSAULT.—An employer is not liable for an assault committed upon a third person by an employee unless the latter was acting within the scope of his employment. (Michigan Supreme Court, Ducre vs. Sparrow-Kroll Lumber Company, 133 Northwestern Reporter 938.)

For the Improvement of Rail Quality

Views of Railroad Presidents and Rail Manufacturers on Measures Which Should Be Taken to Lessen Rail Breakages—The Question of Heavier Sections

In *The IronAge* of February 29 were given some expressions made by presidents and other officers of leading railroads, indicating an improvement in rail quality in the past two years. In view of the widespread interest in the subject and of the important results promised for the co-operative movement started by Chairman Gary, of the United States Steel Corporation, we print below considerable extracts from the discussion at the New York meeting of February 15. As already stated, this meeting was called by Judge Gary and was attended by railroad presidents and other railroad representatives and by presidents of various steel companies manufacturing rails. Only portions of the discussion can be given in the space available. A number of railroad officers not quoted here expressed their approval of the movement.

JUDGE GARY: I believe unless we actively, persistently and effectively pursue this subject to a right solution, we shall find ourselves in the hands of commissions of some sort, like they have in England, a Board of Trade, a Chamber of Commerce, an Interstate Commerce Commission, a State Commission, or some other authority, which shall lay down for us formulas in accordance with which we shall be obliged to manufacture our rails. We may come to that anyhow. But I believe such a result is to be deplored from every standpoint, from the standpoint of safety as well as from the standpoint of economy and from the standpoint of practicability.

I do not think that a rail made in accordance with the specifications adopted and enforced in England is the rail that ought to be manufactured for use in this country, with the heavy and increasing weight of the cars and engihes, although such a rail as that would be easier for the manufacturers to produce, keeping within the lines of perfect safety. I am inclined to think we must in some way or another ascertain what kind and character of rail is necessary to be adopted at this time. In the first place I do not think that the weight of the rail in use is heavy enough—that the weight of the rail has been increased in proportion to the weight of the equipment—and particularly in view of the great rate of speed—and more particularly during weather such as we have experienced during the last few months. With an engine counterbalanced for a certain rate of speed, running over rails such as have been more or less in use on some of the lines, and increasing that rate to meet the exigencies from time to time, we know it is almost impossible to construct a rail that will endure under such usage as that.

Now, gentlemen, as we have been furnished so many different specifications by different railroads and have had under consideration so many different and conflicting opinions from the different railroads, there seems to be nothing left for us to do except to ask you gentlemen to come together and with us go over this whole subject matter in detail. We are not here in the attitude of saying to you gentlemen, "We will make and we will not make a certain kind of rail." We are here to try and satisfy you, first; and secondly, with you to try and satisfy the public that we are performing our whole duty concerning the subject matter. We do not wish to be driven or even urged by public officials to make changes and improvements; we prefer rather to take with you a leading position. We have more interest in the patrons of the railroads than the general public has. There are people who would like to be our guardians, who would be pleased to have us follow their advice and directions. But, gentlemen, we are fully as capable of taking care of those who rely upon us as the less posted members of the public who are quite inclined to express opinions and to try to form public sentiment.

It has seemed to me, if I may be allowed to say it, that the experts of the railroad companies and the manufacturing companies respectively have not made as much progress as they ought to have made. I say that without any disposition to criticise. But from considerable experience in dealing with experts, which I have no doubt is similar to the experience which the rest of you have had, it is not an easy matter to bring experts to the same opinion. They deal more or less at arms' length. They become prejudiced in favor of certain conclusions. * * * Of course I am not insisting that the specifications should be exactly the same with respect to all sizes of rails. Perhaps they need not be exactly the same with respect to various localities, although I am not so certain of that. Temperature may have something to do with it. But I want to insist upon this one thing as a proposition which ought not to be denied: In view of the weight of equipment in use at the present time, and in view of the great rate of speed, it is necessary for the railroad companies, if they are desirous of doing their whole duty to their patrons, and therefore to the public, to put and keep their roadbeds in the very best possible condition. And it is necessary for the manufacturers of rails to make the best rail which is practicable. I think we cannot escape these conclusions. We want to meet you on that basis. We are alarmed at the growing sentiment against rails, notwithstanding, as I say, criticisms have been often unjust and the claims made very much exaggerated.

Heavy Breakages Due to Cold

HOWARD ELLIOTT, president of the Northern Pacific Railroad Company: The road that I represent, in common with some others this winter, has suffered from severe temperatures, rather more so than for several years past. In our investigations we looked up records of some time ago and we found that we had rail breakages then of lighter sections of rail, of different content of rail, just as we are having them today of heavier sections and of different chemical composition. And it seems to us that for some reason—and the experts will have to try to find out what it is—the excessive cold has had a very marked influence on the breakage of rails. * * * It is a very singular thing that our records show that in the last few years the kind of rail that we have been buying has broken to a very small extent west of the Rocky Mountains, whether it is 72-lb. rail, which was the section used when I first went with the Northern Pacific eight years ago, or the 85-lb. section which we adopted as soon as I went there, or the 90-lb. section which we have been using the last three years. But east of the Rocky Mountains we have been having more rail breakages, and it is fair to say that the principal breakages have been in the 85-lb. section—that is in our main line—except where it has been replaced in the last two years with the 90 lb. But there have been more breakages of the 85-lb. section per mile of rail laid or per thousand tons of rail laid than there have been of the 90-lb. section.

In December, 1910, there were thirty-three 90-lb. rails broken in the so-called cold weather district of the Northern Pacific; and in December, 1911, 57—nearly twice as many. In December, 1910, there were 316 85-lb. rails, and in 1911, 523. In both of those cases the amount of 85-lb. rail that broke was in excess of the proportion that should have broken, compared with the breakage of the 90-lb. rail. Within the first sixteen days in January there were 106 breakages in 90-lb. rail in 1911, and 177 in 1912. But this was the startling thing, that we had 1091 85-lb. rails break in sixteen days, compared with 486 in January a year ago.

Breakage Along a Fine Line

We have found that in some of our rails that broke there seemed to be a little fine line along the surface of

the flange, and it would run a certain distance, and then it would begin to break off at right angles. Why that is I do not know. I do not know that anybody knows. * * * * I am not at all clear that raising that section to 100-lb. or any other weight would prevent the breakage, if that breakage is due to these extreme temperatures. * * * * We are buying quite a little bit of 100-lb. rail to put in the cold weather territory to see whether the increased weight of the section will eliminate these peculiar breakages.

Variations in Rails

JOHN D. ISAACS, consulting engineer, Union Pacific Railroad Company: Under identical specifications, weights and sections, some mills deliver entirely satisfactory rails and others do so part of the time, but do not deliver equal satisfactory product at all times, forcing the belief that they vary their manufacturing processes. For instance: Comparing our records of failed rails from January 1, 1908, to June 1, 1908—180 days—with our record of failed rails from January 1, 1910, to November 30, 1911—700 days—the following results were obtained as to relative quality:

The Tennessee Coal, Iron & Railroad Company originally stood at the foot of the list as to quality; they now stand next to the head.

The Illinois Steel Company, South Works, stood next to the head; they now stand at the foot, with the exception of the first lot of Gary rails which were the worst of any.

The Colorado Fuel & Iron Company stood at the head; they are now intermediate.

The original 10,000 tons first received from the Gary works stood at the foot; those which we are now receiving stand at the head. This seems to indicate quite clearly the fact that there must be some considerable variation in the practice from time time of the different manufacturers.

Some confusion seems to exist to the effect that hardness and brittleness are identical. This is not really the case. In our experience with rails our records indicate quite strongly that we are getting improved results as we raise the carbon, which we have been doing tentatively and gradually little by little for several years. By far the greater portion of our failures are from defective heads, pipes, flaws, etc., and with the soft metal these are as apt to cause an accident as with a hard. We are not now inclined to advocate very high carbon and we certainly object to very low carbon, believing one will be as prolific of rail failures as the other, as there is a certain mean at which the metal can stand most punishment. At any rate, in rails of 90-lb. weight, the average of carbon used by all of the principal railroads of the United States is below that used by the Harriman lines, while the average of breaks per 100 miles of all of the principal railroads in the United States for the same weight of rail is a little more than five times the average of the Harriman lines.

"A" Rails Better than Those Lower in the Ingot

As regards the discard, our specifications now require nine per cent. which appears to be about the usual thing allowed by the mills themselves. We at first practically increased this to 29 per cent. by segregating the top rails from the ingots, namely, the A rails, and using them for light branch line service and sidings. As usual under operating conditions, however, it was found necessary to run pretty much the same equipment over these so-called light branch line track as over our main lines, and to our surprise we found the A rails to show up better than the average lower down in the ingot, we, therefore, discontinued the segregation of the A rails for light service. The consequence of this has been that we have had more failures in our main line heavy traffic of the rails made from below the top of the ingot than the A rails even as regards flaws and piping; in other words, our evidence seems to show that our discard might with advantage have been taken from further down in the ingot instead of the top; granted, of course, that the original 9 per cent. is first taken off. From this we conclude that a 29 per cent. discard would not insure sound metal in ingots as now made.

Open Hearth Rails on the Lackawanna

W. H. TRUESDALE, president Delaware, Lackawanna & Western Railroad Company: We have not had and have not recently had any serious or alarming trouble from broken rails. There are some significant cases that we have every once in a while on stretches of our line where a number of broken rails are to be found within a short period, and running the thing down we usually found that that was due to some defective condition of the rolling stock. We have today under exactly the same conditions 75 and 80-lb. rails on our track that is upwards of 15 years of age and is still in our track, where rail of a heavier section has worn out in one-half that time or less than half that time. If our company could get a rail such as was made in the 90's there would be no criticism.

And for the reason that we were not getting the increased wear nor the safety of the heavier sections of the rail, it was only comparatively recently that we went to the 100-lb. section rail which we have now made our standard. * * * * In the last two or three years in the open hearth rail we have been buying and using we are getting very satisfactory results. We are certainly getting a good deal better rail than we did when we took up this question about three or four years ago.

Experience of the New York Central

W. C. BROWN, president New York Central Lines: I doubt very much whether it is going to be practicable for all the roads in the country to agree on a standard rail, any more than it would be practicable for them to agree on a standard coach, or a good many other things that are governed very largely by local conditions. We came to the conclusion a number of years ago that we had to give up the Bessemer rail, that it would not do at all for the traffic that we had and the conditions under which it had to be used. We experimented for two or three years with an alloy of ferrotitanium, with very satisfactory results. But we are being driven to the conclusion that that will not do. And last year we bought, I think, about 160,000 tons of open hearth rail, which is giving us very satisfactory results.

Notwithstanding the almost unparalleled severity of conditions this winter, and with a very heavy traffic—our Century running almost every night with two of our heaviest passenger engines pulling them—I do not think we have had a single break of those rails, except a very few, I should say perhaps five, that we traced directly to a broken wheel; but no breaks under fair conditions.

Bessemer and Open Hearth Rails

A. C. DINKEY, president of the Carnegie Steel Company: I am sure the manufacturers have always left to the railroads everything that they could in the way of prescribing chemistry for rails. I know they are willing to do it in the future. I do believe that when you will state your problem of rail uses you will find that you cannot make one specification for general use. You will find that some railroads require a very much heavier duty than others. I do believe that we can make a specification for average uses. Then those engineers who know that they require something above the average will be able to make a specification suitable to that road. There is a difference between the cold and the warm districts that can be reflected in the specifications. There is an item with respect to Bessemer and open hearth that Mr. Brown touched on. The nature of open hearth steel is to be a more ductile steel, and it is reasonable to expect fewer breakages in open hearth than you may expect in Bessemer, if they are both subjected to a duty which is above a certain critical line.

Dr. Dudley's Ductility Tests

Dr. P. H. DUDLEY, New York Central Lines: I wish to show you some of the results we have obtained in making steel under our ductility tests. Our specifications require that there shall be three tests made from each melt of steel, one from the first ingot, another from the middle ingot of the melt and a third from the last one poured. The specifications require that two tests shall show at least 5 per cent. elongation in two consecutive ingots, and in the third we exhaust the ductility in that steel. By ductility I mean elasticity. Then in the manufacture we notice just how much ductility there was in the steel. This is the first opportunity the manufacturers have ever had of knowing the ductility in every melt of steel. All this information is obtained by the drop test.* * * I have calculated what ductility it is possible to obtain from a specified chemical composition. If I have a 0.62 carbon we

can get 25 per cent. ductility. But as the carbon increases of course our ductility will slightly decrease. And we arrange our composition so that the ductility or tenacity and toughness of this steel shall be what we consider entirely proper for our temperatures of 40 deg. below zero. * * * Now while our specifications are only arranged at the present time for high speed, that is, for rails we want to put in our high speed passenger tracks, the matter is under such complete control that if we wish at the terminus at New York a different grade of steel we would be perfectly content with a 5 or 6 per cent. ductility, but with an increase of carbon. That is something we know and can control. * * * Where we go too low in carbon, then we make a very soft material, and our drivers slip, and very soon transverse checks will develop. And we have given orders that as soon as that is found it must be removed from the track immediately, otherwise you break that into several pieces.

These ductility tests do not detain the mill at all. You would hardly know they are being made; it is done so quickly. When you come to take our 74 carbon, that is within one point of the limit, we are getting out of a great many of those heats 15 or 16 per cent. ductility. But if we should go to an 80 carbon, then of course we would expect a less ductility. For our passenger service we want to limit it at the present time so that we can get in the majority of the heats 15 to 16 per cent.

Larger Discard Though at Greater Cost

DANIEL WILLARD, president Baltimore & Ohio Railroad Company: I have been told that if we want to get rid of all the dangers from piping and segregation we might even have to go to 20 or 30 or even 50 per cent. discard. * * * As conditions are today I do not think the railroads can properly give so much consideration to the cost of the rail as they have in the past. The railroads will be held responsible for buying the best rails they can get. I am sure if there is any question about the integrity of the top end of the ingot, and it should be laid before public officials, they would say that it should be thrown out of use and discarded, regardless of the effect it might have upon the price.

I was confronted with this proposition in purchasing our rails this year. In consulting the steel manufacturers this statement was substantially given to me, that the general practice was now to discard, we will say, about 9 per cent, but that if we would discard as much as 20 per cent. we would probably do away with 90 per cent. of the failures. * * * I really felt that it was my duty to pay as much as we had to pay in order to get that greater element of safety. At the same time I did not feel the confidence that I would like to feel that that was the best thing to do. We have got to get the best rail we can get. If we have to pay more for it we will have to pay it.

Increase the Factor of Safety

GEORGE G. CRAWFORD, president Tennessee Coal, Iron & Railroad Company: Our problem as I see it is to increase the factor of safety. There are several ways in which that could be done. The mills can improve their practice still further. Less severe service could be put on the rails, the section could be made larger, and some of the sections certainly could be improved in design. The composition of the steel could be improved in the direction of a more ductile rail. Now these changes may involve expense to the railroads and involve expense to the manufacturers. That should be a subject, I think, for future consideration. We could begin to go a little way in the direction of making a softer rail. It is known among the people who use the rails that the larger number of rails break in the first period of the service in the track. It seems to me that the most dangerous breakages, the ones that are apt to cause the greatest amount of trouble, are the rails that break from brittleness. I think it is logical to suppose that those rails will break in the latter period of their service. The harder rails perhaps would last for a long time without any interior defect, and as the result of repeated stresses beyond their fiber strength they will eventually break. I do not think it is safe to assume that because of the breakages in the high carbon rails in the first period of their service, that that will prevail in the latter part of their life. I think that the question of carbon segregation in the top end of the ingot is one that will be heard from perhaps later in regard to these brittle rails. They probably have not been in the track long enough for that trouble to develop. I do not think that the specifications that our mills are working under to-day would have given trouble if we were sure that the carbon contained in the rail was no higher than it was in the specification. But our experience is that a crop of nine per cent. does not remove on the average a segregation of carbon that is considerably higher than the specification.

Experience with Heavier Sections

A. W. GIBBS, chief mechanical engineer, Pennsylvania Railroad: So far the evidence does not show that rails rolled on recent specifications have been breaking to anything like the same extent as the older rails. We have been rather pleased so far with the results. What we are afraid of is that either some Congressional committee or some State committee, or the Interstate Commerce Commission will take an arbitrary view and demand softer rails and heavier rails.

About twenty years ago we changed on our eastern lines from an eighty-five pound to a hundred pound rail; and I recollect very clearly the great disappointment in our heavier rails. In some of our meetings they proposed going back to the older rails. Looking it over lately, in view of some of the larger rails recently turned out, it strikes me there may be another solution entirely. The rail of course has to meet the kind of equipment which runs on it, and the greater part of the equipment is the freight car equipment. Those wheels are more or less worn. Anyone who introduces a rail materially larger than the average will submit that rail to unfair usage, because it gets wear outside of the wheels. If you are running on a small rail all the time you will get a comparatively narrow groove of the wheel; if you put that on a larger one it comes in a comparatively narrow place. Those large rails fail because they get unfair treatment from the wheels. Now there have been some recent cases of other people who have introduced larger rails, and the prevailing opinion is that those rails are failing from the same cause.

Progress Has Been Made

F. W. WOOD, president Maryland Steel Company: Following a meeting similar to the present one, in 1907, two committees were appointed, one by the railroads and one by the manufacturers. A series of joint sessions followed, which resulted in presenting to the railroads modified rail sections which were intended to aid in producing a better quality of rail. We have heard to-day expressions regarding the value of the decision reached at that time. I think we can feel that some progress was made. The other branch of the joint committee work has been an effort to prepare a specification which should govern the chemical composition of the metal. That work has now reached the point of the preparation by the railroad engineers of a specification which I understand will be presented at the coming meeting of the Railway Engineers' Association in March and recommended for adoption as a standard. The manufacturers have endeavored to coöperate with the railroad representatives in making clear the conditions which necessarily enter into the making and rolling of the steel, many of which we are able to control fairly, some of which knowledge of the art enables us to modify or control very little. We have not yet arrived at the point where all rails can be made alike. The best rails that can be made must not be taken as a criterion; there must be a factor of safety beyond that required by the selects, so to speak. * * * The matter has been most carefully gone over, first by the manufacturers' committee of experts, and again by the presidents of the rail manufacturing companies, nearly all of whom have been through the mill and are practical men. And the conclusion has been reached that under existing conditions, for an average prescription, we ought not to make the rails any harder and if anything we ought to make them a little softer than the maximum that is called for to-day.

E. A. S. CLARKE, president Lackawanna Steel Company: I think that the talk here to-day shows the necessity of special specifications for varying conditions of service and differences of climate. Individually I have always believed that the railroads have gone too far in hardening qualities of the rail, impelled thereto by the fact that they were getting unsatisfactory wear, as their weight of equipment

and amount of service increased, and they were told that the way to get rid of that was to harden the rail. I believe that the immediate relief for anybody who in his particular position is being troubled with breakage to an extent that is dangerous is to soften his rail. Yet we have illustrations where a hard rail is giving entire satisfaction. Mr. Truesdale has stated for his road that the question of breakage is not one that bothers them. These rails are of about the highest carbon in my knowledge.

There is another reason in my mind for advocating a less hard rail, looking toward greater safety, because it is impossible for a steel maker to make all of his rails as good as the best. There are certain unavoidable contingencies in manufacture; there are little bubbles of gas, blow holes and little globules, and there is the occasional segregation, and so on; and those things in many cases seem to be the cause of rail failures. In my judgment they are the cause of rail failure because the character of the steel is up towards the danger zone of hardness; in a less hard steel the effect of those things would be greatly lessened.

Uncertainty as to the Proper Discard

E. J. BUFFINGTON, president of the Illinois Steel Company, referred to the way in which the State Railroad Commissions were taking up the question of rail quality. He believed it should be settled between the railroads and the manufacturers and not by commissions or by outside experts. He had found that reports from two roads on lots of rails made at practically the same time, under like conditions and to the same specifications, often showed greatly differing experiences, the less favorable experience being attributed to defects in the manufacture of the steel. He emphasized the importance of complete and exact data concerning rail breakages. At times the manufacturer may be more regardful of low cost than of quality, but he believed progress has been made and that better attention is given to the manufacture of rail steel than ever.

"I as a manufacturer of rail steel cannot intelligently or to my own satisfaction to-day answer Mr. Willard's question as to whether or not the top part of the ingot is unfit for use in rails. And my uncertainty is based upon data which has been furnished me by the railroads from their experience with the rails in the top of the ingot. At first a few of the railroads believed conclusively that that part of the ingot was unfit to go into rails, but they adopted a system by which accurate information was had with reference to the comparative service of those rails with the service of rails made from the different parts of the ingot. They lettered the rails. And from experience obtained in that way some of them have reversed their former conclusion with reference to the unsuitableness of the steel from the top of the ingot."

Different Rails for Different Districts

C. S. PRICE, president Cambria Steel Company: We are making better rails than ever before and I desire to continue to do so. The problem is a thoroughly mutual one. We want to make the safest rail possible; but we must look to the railroads to tell us what they want; in other words, the data must come from them. I say for that reason that the problem is largely a local one. Every road has its own problems to solve; every one has its various equipment; roadbeds are different; climates are different. And while it would be very easy for us to solve our problems if we could adopt one specification and work to it, it is absolutely impossible to do it, and we may as well face that issue in the beginning. The experts must be the ones we look to to furnish the data. And the problem can only be solved on expert data interpreted, with a give and take spirit, finally by the executives. I believe it would be very unfortunate if there was any attempt to give any very general conclusion in the near future. There is no use of any of us being stampeded by this era of investigations and commissions. I think it is only a question of our endeavoring to work harmoniously, each recognizing that the other is trying to attain the same end—public safety.

ROBERT JOB, chief chemist of the Lehigh Valley Railroad Company, cited two instances of rail failure traceable to lack of care in mill practice. In the matter of discard, much depends upon the methods of the manufacturer. "Under some conditions we find that as low as 9 per cent. will give very satisfactory general results, and under other conditions 20 per cent. will not eliminate the piping and different defects that occur."

In many cases trouble arises from a single ingot, whereas the rest of the heat is good. He had devised a system of drop tests, not taking the rails throughout the entire heat, but from the ingots. Six tests are made from six individual ingots and each rail is numbered with the ingot number as well as the heat number. Then the tests are made under the drop. Thus a fair number of rails are eliminated where the ingots were brittle. It would mean the rejection of, say, five rails instead of the entire heat. After a good many thousand tons of rails had been rolled it was found that the mills would not be held up in their work, even with as high as a 10 or 12 rail test from each heat, made under this ingot system, and using only one drop test.

"I am thoroughly in accord with the general proposition which has been stated of determining these matters by ourselves. We certainly cannot agree in the one particular which has recently been brought up by the Interstate Commerce Commission, as to the cause of transverse cracks. We have proof which absolutely disproves the statements which have been made by the Government experts."

The Production of Spelter in 1911

The United States Geological Survey has just issued its annual advance statement of spelter production for 1911. This statement, prepared by C. E. Siebenthal, gives the final figures of output as made up from the smelter reports and is not subject to change unless an error is discovered in those reports. The production in the United States in 1911 from domestic ores was 271,621 net tons and from foreign ores 14,905 tons, a total of 286,526 tons, compared with 252,479 tons, 16,705 tons, and 269,184 tons, respectively, in 1910, a gain of 17,342 tons, or 6.4 per cent. The world's output of spelter in 1911 was 974,385 tons, compared with 883,419 tons in 1910, a gain of 90,966 tons, or 10.3 per cent., showing that the United States did not make its quota of the world's gain. This country's share of the world's production in 1911 was 29.4 per cent., compared with 30.5 per cent. in 1910 and 30.1 per cent. in 1909.

Chinese Pig Iron on the Pacific Coast

The reference made in the tariff hearings before the Senate Finance Committee at Washington to the importation of Chinese pig iron makes interesting a statement of the amount of these imports in the past three years. In that time all the Chinese pig iron imported has come to the Pacific coast. In part it is used in foundry mixtures there, but in the past two years much of the importation was for the Western Steel Corporation's basic steel plant at Irondale, Washington. The total imported in 1909 was 4836 gross tons, in 1910 it was 13,924 tons and in 1911 11,857 tons. The value of the imports of last year is put down at $164,933, or $13.91 a ton.

The D. H. Stoll Company, Buffalo, N. Y., has recently completed contracts for the entire equipment with sheet metal forming machinery of three large plants in the South, one in Colorado and two in Canada. In addition some of the largest manufacturers in the country, including automobile, stove, stamping and rolling mill companies, have been supplied with miscellaneous equipment. The company has had extensive experience for the past seven years in building machinery for special work and in designing the minimum machinery and dies required with the least possible operations for the character of product desired, and also in working out special labor-saving devices and attachments.

Customs officials state that extensive frauds in undervaluations of cutlery importations from the Solingen district of Germany have been revealed. Action was instituted last week against a New York firm of cutlery importers to recover $693,750, the full value of all German cutlery said to have been irregularly imported during the year 1910. A similar suit pending against another New York cutlery importing firm is for more than $400,000, and a series of smaller suits also pending in the District Court makes the aggregate amount exceed $2,000,000.

The Machinery Markets

Trade conditions throughout the country are of an encouraging character in the machinery field. There has been a betterment in both sales and inquiries in several sections in the last week, while nowhere is any falling off reported. New York dealers have received a list worth probably $50,000 from the Norfolk & Western Railway and also an inquiry from the Virginia Railway. In actual sales the week has been rather quiet in New York. The Chicago trade has been estimating on a list issued by the receivers of the Wabash Railroad, itemizing 66 machine tools, and in addition to some good orders has attractive inquiries. A fair volume of business has been done in Cleveland, inquiries have been good, and February in that city was better than January. In Cincinnati the month just passed was better than either of the two preceding ones. Detroit has experienced no marked improvement, though there has been a fair demand from the automobile and electrical industries. A better tone is noted in St. Louis. New England conditions are unchanged, but with more business being done than a year ago. Philadelphia has done best with special equipment, and similar conditions have existed in Baltimore. The South is active commercially and there has been a corresponding demand for machinery of a general character. Business in Mexico is at a standstill. The Pacific coast is more active and demands have come from shipbuilding, the wood working industry and salmon fisheries.

New York

NEW YORK, March 6, 1912.

New York machinery houses whose energies are not confined to the immediate territory are figuring on an extensive list of machine tool requirements, issued last week by the Norfolk & Western Railway, whose purchasing agent is E. T. Burnett, with offices at Roanoke, Va. The list of tools wanted includes engine lathes, turret lathes, staybolt machines, power hammers and other equipment, making up a general list of tools essential to railroad machine and forge shops to a valuation estimated at $50,000. It is understood that the machines are to go to more than one shop. At the beginning of the year the Norfolk & Western stated, in reply to an inquiry by *The Iron Age*, that its shop equipment needs in 1912 would call for an expenditure of about $89,500. The Virginia Railway, the purchasing agent of which is located in Norfolk, Va., also is in the market for machine tools. The trade now has before it four extensive lists, that of the Delaware & Hudson Company (on which orders soon will be placed), one of tools for export to Japan, that of the Jersey City Technical High School, and of the Norfolk & Western Railway. Business consummated during the week has not been large and has been mostly in demands for one or two tools and from many directions. Some business has come from automobile manufacturers, a source from which further demands are expected in the near future. Intimation has been given that at least two technical schools, aside from the Jersey City institution, will be in the market before fall. The month of February, while not as good as January, is pronounced by some machine tool builders or their representatives to have been a satisfactory month in point of business done. Both domestic and foreign orders contributed to the favorable report of these companies. As regards the week just passed, satisfaction is not so general, and of some business in prospect there is criticism of price cutting.

The Mackay Mfg. Company, 94 Beekman street, New York, has acquired the plant formerly operated by the New Jersey & West Virginia Bridge Company at Manasquan, N. J. The old plant will be enlarged and some new machinery installed for the manufacture of steam and hot water radiators.

The United States Cartridge Company, a subsidiary of the United Lead Company, 111 Broadway, New York, will soon announce plans for an addition to its plant at Perth Amboy, N. J., which will call for some additional equipment.

The Goeller Iron Works, Newark, N. J., has begun the erection of an addition to its plant at Frelinghuysen avenue, 100 x 200 ft., one story, of steel and corrguated iron construction. The building is intended for a light structural workshop, and will increase the company's capacity to 15,000 tons of miscellaneous structural work per year.

The Pierce Butler & Pierce Company, Eastwood, N. Y., will build a three-story and basement addition to its plant, 50 x 110 ft., brick and steel construction.

The Herschell-Spillman Company, North Tonawanda, N. Y., has completed its new machine shop in connection with its plant on Sweeney street, and converted its former machine shop building on Oliver street into a motor-boat factory, and is equipping it for that purpose.

The Automatic Stucco Machine Company, Portchester, N. Y., has been incorporated with $50,000 capital stock to manufacture stucco machines, cement, cement products, etc. W. A. Mills, Portchester; R. H. Cunningham, Stamford, Conn., and E. B. South, New York City, are the incorporators.

The Painton Brick Company, Troy, N. Y., has been incorporated by J. J. and G. W. Painton of Troy and E. P. Painton, Hoosic Falls, with a capital stock of $30,000, and a plant for the manufacture of brick will be established.

The Burke-Kamra Company, Troy, N. Y., has been incorporated with a capital stock of $500,000 to manufacture moving-picture machines. The incorporators are Lewis Burk, James H. Caldwell, William Connors and J. H. Gleason.

The Sterling Furniture Company, Salamanca, N. Y., has let contracts for construction of a four-story and basement addition, 50 x 114 ft., to its furniture factory.

Corbett & Stuart, Binghamton, N. Y., contemplate the erection of a factory for the production of wood acids at Downsville, N. Y., to cost with equipment about $100,000. Plans are being prepared.

The Montclair Jam Kitchen, Montclair, N. J., will build at Geneva, N. Y., a canning and preserving factory 50 x 210 ft., two stories and basement, with two wings, each 32 x50, first story and basement of fireproof construction, in reinforced concrete and structural steel.

The Anderson Oil Company, Buffalo, N. Y., has been incorporated with a capital stock of $250,000 by C. M. Anderson, formerly with the National Coal Oil Company of that city, and H. H. Hoover, heretofore connected with the T. J. Peterson Company, Chicago. The company will engage in the manufacture of coal oils and foundry supplies. A manufacturing plant 162 x 175, located on the New York Central Railroad, at Swan street, has been secured and will be fitted up with requisite manufacturing equipment.

The Hooker Electro-Chemical Company, Niagara Falls, N. Y., has completed manufacture of bleaching powders and caustic soda plans for a large addition to be made early in the spring to its plant at Buffalo avenue, Union street and the Niagara Junction Railroad.

The Niagara Foundry Supply Company, Buffalo, N. Y., has been organized and has established a sales agency for foundry and contractors' supplies, with offices in the Brisbane Building. J. G. Rappell, E. G. Northrup, formerly with the Buffalo Aluminum & Bronze Company, and S. A. Gaffney are the directors.

The Nassoy-Ryley Storage Company, Buffalo, has been incorporated with a capital stock of $50,000 to conduct a warehousing and forwarding business. A warehouse will be built and some conveying equipment installed. M. P. Ryley, F. J. and H. Nassoy, Buffalo, are the directors.

The Merwin Mfg. Company, Erie, Pa., has been incorporated with a capital stock of $75,000 to manufacture wire products, nails, washers, wall ties and other hardware and builders' supplies; also special machinery. O. G. Merwin, P. P. Miller and H. E. Fish, Erie, Pa., are the directors.

Catalogues Wanted

The Automatic Register Company, East St. Louis, Ill., manufacturer of automatic fare registers, is in the market for type wheels ranging from ¾-in. to 5-in. diameter, both minute and hour wheels, and desires catalogues and quotations of manufacturers of such wheels.

New England

BOSTON, MASS., March 4, 1912.

The machinery market is uneventful. All that can be said is that business in this territory is no worse than it has been in the past few months, and is better than it was a year ago. Answers to inquiries to a large number of manufacturers of metal products indicate that in some lines the demand is very good indeed, while in others it is moderate. Manufacturers are giving much attention to the political situation, and are permitting their judgment to be governed by the chaotic conditions which are created by a presidential campaign.

An option has been secured by Harry W. Smith, Worcester, Mass., on the plants and business of the F. E. Reed Company, builder of engine lathes, and the Prentice Bros. Company, builder of engine lathes and upright and radial drilling machines, both of Worcester, the purpose being to consolidate the ownership. Mr. Smith says: "Whether the consolidation can be brought to a successful issue depends entirely upon the worth shown at the Prentice Bros. Company's plant, after inspection, and the value placed upon the F. E. Reed Company by Mr. Reed, and upon the Reed Foundry Company by John F. Kyes and Mr. Reed, president. You may state authoritatively that if the consolidation is effected the different plants will not be merged. Those who have asked me to take up the matter in their behalf are insistent that Mr. Reed arrange to give as much time to the general management as his health shall permit, and if proper arrangements cannot be made as outlined above and Mr. Reed's supervision retained, the hoped-for consolidation cannot be effected."

The Abbott Ball Company, Hartford, Conn., manufacturer of burnishing barrels and steel balls for burnishing purposes, will erect a new factory at Elmwood, a suburb of the city, near the plant of the Whitlock Coil Pipe Company and on the tracks of the New York, New Haven & Hartford Railroad. The building will be 40 x 100 ft., two stories, of brick, steel and concrete.

The National Safety Appliance Company has established a factory at 90 Allyn street, Hartford, Conn., where it will manufacture a number of safety devices, the inventions of Henry G. Hinckley. Edward Redfield, president of the City National Bank, Hartford, is president of the new company, and John B. Hart of the Roe Calk Company is the treasurer. The company has developed a safety stop for steam engines and other similar devices. Mr. Hinckley, who will be general superintendent, has for a number of years been connected with casualty insurance companies in the mechanical department.

Professor Charles S. Brown, Nashville, Tenn., has acquired a controlling interest in the business of the H. B. Brown Company, East Hampton, Conn., manufacturer of bolt and nut machinery, and has been elected president of the corporation. Abner W. Barton is the secretary and treasurer. Henry B. Brown, the retiring president, withdraws from actual business after 36 years of continuous and successful labor. He will give his attention to literary work which he has long wished to undertake. During these 36 years Mr. Brown has achieved a world-wide reputation for his bolt and nut machinery. The company has brought out two motor-driven bolt cutters with automatic attachment, their sizes being ¾ and 1½ in.

The Heald Machine Company, Worcester, Mass., has sent out invitations for an inspection of the large addition to its shops on Thursday of this week.

The Matchless Heater Company, Holyoke, Mass., has been incorporated with a Massachusetts charter, and a capital stock of $10,000. George C. Gill is president; Peter S. Sinclair, vice-president; Gorham P. Hosmer, treasurer. The matchless heater has been manufactured by the Barlow Company, Holyoke, which will continue to make the appliance, the new corporation being a selling company only. The new arrangement is the result of the rapid growth of the business.

The United States Agricultural Tractor Company, Hartford, Conn., has been incorporated under a Connecticut charter to develop and manufacture a new traction engine. The incorporators are: Lewis C. Grant and Sidney A. Grant, Enfield, Conn., and Frank H. Whipple, C. H. Cooley, George H. Burt and Judge Ralph M. Grant, Hartford. The company has a paid in capital of $55,000. It will first perfect the machine as a commercial product and manufacturing will follow. No equipment will be purchased for the present.

The Mianus Motor Works, Greenwich, Conn., has increased its capital stock from $300,000 to $325,000. The purpose is not to extend the works but to increase the working capital.

The Appliance Mfg. Company, Springfield, Mass., has been organized to manufacture metal appliances of various kinds, especially a new slow-closing valve, adapted for use as a flushing valve. It is the invention of Frank W. Potter and John L. Beck.. Edward M. Beattie, Jr., is president and Mr. Potter treasurer. The plans of the company are not fully matured. Mr. Beattie's address is Court Square Theatre Building, Springfield.

The M. S. Wright Company, 51 Jackson street, Worcester, Mass., manufacturer of piano hardware and vacuum cleaners, has taken another floor in the building, the new space to be devoted to the vacuum cleaner department.

The Sawyer Down Draft Mfg. Company will establish a factory at Mansfield, Mass., for the manufacture of a new type of water heater.. A building will be erected 50 x 150 ft., of concrete, fireproof construction. W. H. Kimball, the treasurer of the company, is quoted as stating that construction will begin early in the spring.

Additions to general manufacturing plants in New England include the following: The Winsted Hosiery Company, Winsted, Conn., addition, to double floor space; Maxim & Maxim, Stamford, Conn., straw hats, four-story building 34 x 78 ft.; National Blank Book Company, Holyoke, Mass., one-story building 42 x 118 ft. to be raised one story; A. & E. Henckels, Bridgeport, Conn., brick factory 66 x 188 ft., two and one-half stories. Glastonbury Knitting Company, Addison, Conn., additions 40 x 45 ft., two stories, and 32 x 57 ft., one story; the W. H. McElwain Shoe Company, South Manchester, N. H., building 54 x 550 ft., five stories, with two wings, each 54 x 328 ft.

The Norwalk Iron Works Company, South Norwalk, Conn., manufacturer of air and gas compressors, has developed a speed limit safety stop, designed for use with steam engines and air compressors, where there are constant and wide fluctuations in speed. Concealed in the rim of the flywheel is a sliding bolt which is held in check by a nicely calculated spring. So long as the wheel revolves at a speed below the calculated limit these parts do not move and are subject to no wear; but the moment the limit is reached the bolt flies out by centrifugal force, and as the wheel revolves the bolt touches a trigger that opens a small steam valve admitting steam to a small cylinder to close instantly a throttle in the main steam pipe and stop the machine. The trigger on the small steam valve can also be pulled by the finger for testing and a wire can be carried from it to any remote point so that the machine may be stopped from a distance. At all speeds under the high speed of safety the general compressor is subject to the controls which vary its speed in accordance with the demands for air. The safety stop is always ready to spring into action at the approach of danger.

The contract has been placed for an addition to the plant of the Waterbury Brass Company, Waterbury, Conn., 70 x 150 ft., of brick, steel and concrete.

The Hart & Cooley Company, New Britain, Conn., manufacturer of steel registers and lockers, will erect an addition 45 x 123 ft., two stories and basement.

The Risdon Tool Company, Waterbury, Conn., is preparing to move its factory to Naugatuck, Conn.

The George Lawley & Son Corporation, South Boston, is preparing to manufacture a line of gasoline engines, in conjunction with their boat and yacht building business. The engineer of the new department is Joseph Barraja-Frauenfelder.

The Noyes Machine Company, South Portland, Me., which has been conducting a jobbing machine shop, has begun the manufacture of new gasoline marine mortar and a feathering propeller.

The Niles-Bement-Pond Company of Massachusetts, which carries on the business of the parent company in Boston, has occupied the store at 93-95 Oliver street, which gives ample space for offices and showroom. The large basement will serve as a storehouse, and consequently the storehouse at 265 Atlantic avenue, as well as the offices in the Oliver building, have been given up.

The official announcement is made at East Douglas, Mass., that the local works of the American Axe & Tool Company will be abandoned, as the result of the absorption of the business of that company by the Kelly Axe Mfg. Company, Charleston, W. Va.

The Indian Head Table Company, Nashua, N. H., will erect a complete plant for the manufacture of extension tables. The owners are John E. Cotton, head of the Maine Mfg. Company, Nashua, manufacturer of extension tables, and Oscar F. Flather of the Grover File Company of the same city, who will be the manager. The building will be in the form of a U, with 200 ft. frontage, 200 ft. depth, giving a structure 60 x 200 ft. at the front, and wings 60 x 140 ft.

The power plant will be situated between the wings. The company is now buying its equipment.

The Geometric Tool Company, New Haven, Conn., has begun work on its new building, which will be 50 x 182 ft., three stories.

Baltimore

BALTIMORE, MD., March 4, 1912.

The betterment shown in general business in this district in January was not maintained in February. Outside of some few special lines the volume of business transacted was smaller and the tone of the market was less aggressive. While considerable general inquiry has been figured on, orders have developed with extreme slowness, although industrial establishments have maintained about an even productive rate, operating on orders previously in hand. In a few cases plants have been working overtime in order to make deliveries required, but they are generally makers of special equipment. In the machine tool lines a few merchants report fairly active buying, considering the season; orders, however, are confined to single tools of a class. Both metal and woodworking tools have figured in sales reported. Some little pump business is moving, but transactions in engines and boilers have been smaller. Railroad buying is practically at a standstill.

Fabricators of structural material have had another lean month. Little business of importance has been closed, orders being mostly confined to small jobs and operations are now on a restricted and irregular scale. Some building inquiry is being figured on, particularly in the South. The demand for contractor's equipment is light, unfavorable weather conditions having interfered materially with outside work. Irregularity in the demand for machine shop and general mechanics' supplies is reported.

The Baltimore Refrigerating & Heating Company states that the mechanical equipment for its storage warehouse, to be built at Eutaw and Barre streets, has been provided for. The work of erecting the new warehouse, which will be three stories high, 24 ft. 5 in. x 85 ft., will be started at once.

The Ellicott Machine Company, whose purchase of eight acres of the Old Quarantine tract for the establishment of a branch plant has already been referred to, has bought 12 acres more. The company is erecting on the new site three structural steel buildings, comprising a work shop 50 x 150 ft.; a power plant, 50 x 50 ft., and an office building 50 x 50 ft. The product is exclusively dredging machinery, and the new plant will be used as an auxiliary to the present one at Bush and Severn streets, and will be used particularly for the building of hulls for dredges and for the assembling of machinery. Little new equipment is now required, although more extensive purchases may be made later on.

The Union Box Company will erect at 1822, 1824 Lancaster street, a 32 x 83-ft. addition to its plant. The contract for the work has been awarded to J. J. Moylan. This concern will not require any additional power equipment, but has already purchased some of the woodworking machinery which will be needed for the equipment of the new addition.

The City Ice Company will build a one-story brick boiler house, 77 x 41 ft., on Falls Road near Cedar avenue, which will be required in connection with its new ice plant now being erected.

The Nilson Yacht Building Company, whose plant is located at the foot of Light street, will erect a 40 x 80-ft. addition, which will be used for boat and yacht building purposes.

The Auman Machinery Company reports a fair demand for both metal and woodworking machinery. Some good sales of pumps are reported, but the demand for machine shop supplies has been quiet. While orders have been largely in the way of single tools, the aggregate business was considered pretty fair considering general conditions. A fair volume of inquiry is noted and it is believed that business will show an increase this month.

Permission to erect a new bottling plant, 44 x 100 ft., has been granted the G. B. S. Brewing Company. F. Decker & Son have the general contract. Detrich Brothers will supply the structural material.

The American Can Company has been granted permission to erect a two-story addition, 32 x 100 ft., to its plant on Luzerne street, between Hudson and Boston streets. N. M. Loney is said to have been awarded the contract.

Local contractors are figuring on a new brick, steel and concrete foundry building and equipment for the Navy Department, Washington, D. C. Plans call for a one-story building, 131 x 362 ft., with a slag roof.

Bartlett, Hawyard & Co. have a contract for a 6,000,000 cu. ft. capacity gas holder, to be erected at the Spring Garden station of the Consolidated Gas, Electric Light & Power Company. The matter of building a new machine shop at the plant of this company remains in *statu quo*.

Further information in regard to the recently reported statement of the general manager of the Baltimore & Ohio Railroad Company, in reference to the building of new shops at South Cumberland, Md., is not now available. It is stated, however, that the proposed improvements will cost between $3,000,000 and $4,000,000.

It is understood that the Title, Guarantee & Trust Company will erect a new office building at Lexington and St. Paul street. The tentative plans call for a building 70 x 112 ft., four stories.

The purchase of 47 acres of ground near Loveley Station, on the Baltimore & Ohio Railroad, by the Loveley Distilling Company is announced. It is stated that a new distilling plant is to be built on the site, for which plans are now being made. The new company is said to be affiliated with Blumenthal & Bickart, Inc.

Philadelphia

PHILADELPHIA, PA., March 5, 1912.

Orders are still almost wholly confined to small odd lots of tools and there is little in sight to indicate that buying will become much more active in the near future. Business in special equipment is on a rather better basis than for the general line of metal working tools. Some little business has been placed in electric cranes, a few orders have been taken for special grinders and occasional contracts are closed for heavy special equipment. Tariff uncertainties, the possibility of a coal strike and the general lack of any material betterment in industrial lines in the East have a depressing influence on the trade. There is still an absence of any material inquiry for tools from the railroads in this district. A little better volume of business for export is noted, but has been confined largely to special power transmission equipment.

Second-hand machinery and tools have been in but light demand, reflecting the general condition of the trade. Occasional inquiries for power equipment are noted, but are usually confined to that of the smaller units. Foundries are still operating on a very irregular basis, few have any large orders on their books and are mostly dependent on day to day business.

Work has been started on the new plant for the Hess-Bright Mfg. Company, previously reported. We are advised that nothing in the way of equipment purchases will be made until about April.

The Standard Pressed Steel Company notes quite an improvement in business. A good volume of domestic orders has recently developed and, while individual orders are usually small, they make up in number what they lack in size. Quite an improved foreign demand for pressed steel shaft hangers is reported and good shipments have been made to Austria, England, Scotland and Australia. The company's plant is now being operated at full time.

The Defender Dry Plate Company, Wayne Junction, W. E. S. Dryer, engineer, has received bids for the erection of a one-story power house. It has been decided to install a Skinner engine, but the matter of the boiler installation is still open.

The Hess Machine Works has orders in hand for seven sets of file making machines for export, also for two complete file making installations for parties in the Middle West and several file making machines for plants in the East. A number of special machines are also being built. While inquiries have fallen off to some extent, the plant is busy on orders in hand and the prospects for improved conditions more favorable.

Day & Zimmerman, engineers, have begun work on the plant to be erected for the Hess-Bright Mfg. Company, previously reported. Considerable work is also under way by these engineers for the extension of the lines of the Pennsylvania Central Light & Power Company, for which they have just completed the installation of a 2500 k.w. General Electric generator and 2400 hp. battery of Edgemoor boilers, at its Warrior Ridge power station.

The finishing department of the Germantown Tool Works, Germantown, was practically destroyed by fire on February 27. The plant will be immediately rebuilt

and one of the other buildings of the plant will be temporarily fitted up within the next ten days until a new building can be erected.

The C. H. Wheeler Mfg. Company states that owing to the rapidly increasing business in its high vacuum turbine condenser, evolving a demand beyond the capacity of its present plant, it has purchased a plot, 150 x 400 ft., adjoining its plant on Sedgely avenue, Philadelphia, on which will be erected an additional machine shop, to be equipped with a 30 and a 10 ton overhead traveling crane, together with electric hoists and the very latest types of electrically operated machine tools. Its requirements in the machine tool line have not yet been fully decided upon. The proposed improvement will increase its capacity 50 per cent, and it hopes to have the new plant ready for occupancy by September.

Chicago

CHICAGO, ILL., March 1, 1912.

The most important inquiry of the week in the machinery market was the list sent out by the receivers of the Wabash Railroad from St. Louis for which quotations were requested to be submitted March 4. The list covers 66 tools, including lathes, milling machines, boring machines, wheel presses and other heavy equipment for general railroad shop use. In addition to the encouragement offered by this inquiry, which will undoubtedly be closed promptly, the purchase by Barnard & Leas, Moline, Ill., whose plant was recently destroyed by fire, of tools aggregating in value about $18,000 has contributed a degree of activity to this market. The sale was made by Joseph T. Ryerson & Son and included two large boring mills, radial drills and lathes. The Chicago, Burlington & Quincy closed for machines valued at $4,500 and other sales aggregating close to $8,000 are noted. The M. Rumely Company, La Porte, Ind., is in the market for a number of tools that are understood to be for installation at the Richmond, Ind., plant. There is an inquiry in the market for a 60-in. second-hand planer. General conditions in the machinery trade do not warrant anticipation of a consistently steady demand for tools and inquiry is erratic. The machine tool interests, following a period of deepest concern and persistent activity in connection with the Underwood bill, feel that there is little likelihood of its passing the Senate at the present time. It is also felt that the information gathered together at this time by the most strenuous effort upon the part of machine tool manufacturers from all portions of the country will be available in the future in much more advantageous form should the question again come up.

The McClelland Company, Chicago, has been organized with a capital stock of $100,000 to engage in the manufacture of ice-making machinery. The incorporators are: Enos W. Shaw, Chas. C. Case, Jr., and B. M. Osbun.

Butler Bros., Chicago, are having plans prepared in the offices of D. H. Burnham & Co. for a 20-story mercantile building adjoining their present location. The new building will be 150x 388 ft. and will cost $1,500,000.

The Wheeling Corrugating Company, Chicago, is about to erect a new storage warehouse 126 x 203 ft. at a cost of $150,000. It will be located at the corner of West Harrison street and Campbell avenue.

The Kropp Forge Company, Chicago, has been incorporated with a capital stock of $40,000 to manufacture machinery. The incorporators are: Charles A. Kropp, Frank Schoenfeld and Benjamin Ehrlich.

Fillmore W. Todd has taken out a permit for the erection of a two-story brick factory 49 x 133 ft. at 2817 South Halsted street, Chicago, to cost $15,000.

The Stevens Mfg. & Supply Company, Chicago, has been organized with a capital stock of $10,000 by Chas. E. Schon, 934 Glengyle place, for the manufacture of machinery.

Charles Browning has been issued a permit covering the building of a two-story brick factory 67 x 163 ft. at 6910 Lafayette street to cost $20,000.

Samuel Nachenberg will build a one-story shop 26 x 81 ft. at 1335 South Union street, Chicago, to cost $6,000.

The Paragon Foundries Company, Chicago, has been organized with a capital stock of $24,000 to do a general foundry business. The incorporators are: Thos. J. Condon, I. I. Livingston and Lee H. Sachs.

T. E. Brown will build at 1115 Washington boulevard, Chicago, a two-story brick machine shop 25 x 100 ft. at an estimated cost of $3,000.

The Knickerbocker Briquette plant at Murphysboro, Ill., owned by A. G. Kupfel, of New York, and equipped for the briquetting of coal, was burned February 18 with a loss of $100,000. It will be rebuilt and will be re-equipped with machinery.

The Fairfield Ice Company, Fairfield, Ill., with $15,000 capital stock, has been incorporated by L. A. Blackburn, J. R. Crews and R. O. Mitchel, and will build and equip an artificial ice plant.

The Illinois Car & Mfg. Company, Chicago, has filed notice of an increase in its capital stock from $100,000 to $175,000.

The Crary Machine Works, Chicago, has arranged to move its business to Benton Harbor, Mich., where work has been started on the erection of a new mill construction factory 50 x 150 ft.

Barnard & Leas Mfg. Company, Moline, Ill., whose plant was recently burned, has decided to rebuild on the old site. Orders have been placed for a number of new machines.

The Elgin Mattress Company, Elgin, Ill., will tear down its present manufacturing quarters and build a new factory building 35 x 110 ft., in which new and improved machinery will be installed.

The city of Streator, Ill., is considering the building of a municipal lighting plant, the estimated cost of which is $51,500.

The Fort Atkinson Canning Company, Fort Atkinson, Wis., has decided to erect a three-story factory building adjoining its present plant. It is planned to equip the new plant with the latest machinery.

The J. I. Case Threshing Machine Company, Racine, Wis., will begin as soon as the condition of the ground permits the erection of new manufacturing buildings involving an estimated expenditure of $1,500,000.

The A. Y. McDonald Mfg. Company, Dubuque, Iowa, builder of pumps, has completed plans for the erection of a four-story addition to its plant, 100 x 260 ft., and to cost $75,000.

The city of St. Paul, Minn., will open bids March 11 for furnishing and installing a 1,500,000-gal. pump. John Caulfield is secretary of the water commission.

Cleveland

CLEVELAND, OHIO, March 5, 1912.

Local machine tool dealers report the volume of business done during February shows quite a satisfactory increase over January. A fair volume of orders came out the past week, mostly for single tools. The largest new inquiry is from western Ohio for three lathes, two shapers and two milling machines. None of the larger inquiries recently noted, ranging from 10 to 15, tools have not yet been placed, but these are expected to result in some business shortly. The demand for second-hand machinery is fairly good. Manufacturers in handling and conveying equipment of various kinds for manufacturing plants report a good volume of live inquiries.

The Meilink Mfg. Company, Toledo, Ohio, will increase its capital stock from $50,000 to $150,000 and expects to build a plant on a new site on Oakwood avenue and the Lake Shore Railroad. The company manufactures safes.

The Bay Shore Mfg. Company, Sandusky, Ohio, will increase its capital stock from $10,000 to $25,000 in order to place on the market a kitchen cabinet recently patented by George W. Maley. Charles F. Michler is president of the company.

The C. O. Bartlett & Snow Company, Cleveland, has increased its capital stock from $60,000 to $500,000. The company has under consideration additions to its plant. The extent of these additions has not been decided on, but may include a foundry.

The Miller Rubber Company, Akron, Ohio, will build a new plant, plans for which are being prepared by the Osborn Engineering Company, Cleveland. Considerable new machinery will be required. A power plant will also be built which will include two steam engine driven units of 1,000 kw.

The American Stove Company, Cleveland, Ohio, has awarded a contract to Hunkin-Conkey Construction Company, Cleveland, for a factory building for polishing purposes. It will be 31 x 55 ft.

The Stine Pottery Company, White Cottage, Ohio, will rebuild its plant which was recently burned. The company plans to spend $50,000 in a new plant. A brick and concrete structure will be erected two stories high and 196 x 200 ft.

The plant of the Canton Brass & Machine Company, Canton, Ohio, was damaged by fire February 28, the loss amounting to about $3,000.

The Ohio Steel Foundry Company, Lima, Ohio, will make a number of improvements to its plant and will build a pattern storage house.

R. C. Skeil, Cleveland, Ohio, is buying machinery equipment for a machine and automobile repair shop.

The village of Cambridge, Ohio, will hold a special election March 2 to vote on the question of issuing bonds for the construction of a sewage disposal plant.

Cincinnati

CINCINNATI, OHIO, March 4, 1912.

The next quarterly report of the Cincinnati branch, National Metal Trades Association, is expected to show about 82 per cent. of activity against 72 per cent., the record for the quarter ending December 15 last. While this report will deal mainly with machine tool builders' operations, it is understood that all general manufacturing lines have averaged about 10 per cent. improvement during the past three months, and considering very adverse weather conditions during January and February, this is an excellent record.

The foundries are still having trouble with coke shipments, and there is a general complaint about railroad delays, and indications are that the present vexing situation will continue for at least two weeks more.

In addition to the improvements planned by the Alvey-Ferguson Company, Oakley-Cincinnati, contract has been let to the Allyn Engineering Company, Second National Bank Building, Cincinnati, for a one-story steel and concrete power house, 37 x 70 ft. Considerable power plant equipment will be required, including two 150-hp. boilers. The factory extension planned to be erected during the summer season will be 80 x 180 ft., three stories and basement, all of steel and concrete construction.

Business men and manufacturers from all over Ohio attended a banquet given at the Cincinnati Business Men's Club, on the evening of February 28. Ex-Senator J. B. Foraker addressed the meeting on the subject: "What's the Matter with Business?" He was followed by William J. Burns, the detective, who held the close attention of the audience for nearly 30 minutes. W. H. Stackhouse, of the French & Hecht Company, Springfield, Ohio, offered the resolutions adopted that are referred to in another column:

At the regular annual meeting of the Philip Carey Mfg. Company, Lockland-Cincinnati, Ohio, the following officers were re-elected for the ensuing year: George D. Crabbs, president; R. B. Crabbs, vice-president and treasurer; Edward Buse, secretary, and W. J. Moeller, superintendent. The annual report shows a very satisfactory year, with an excellent outlook for business during the current year.

Considerable structural material will be needed for the new building to be erected for the Crane-Hawley Company, at Ninth avenue and Broadway, Cincinnati. The proposed building will be of steel and concrete construction, five stories, with basement. Elzner & Anderson, Ingalls Building, are preparing the plans.

A small repair shop will be installed in the garage of the Phillipi Auto & Supply Company, Phillipi, W. Va., recently incorporated with $10,000 capital stock. Randolph Stainaker is one of the principal incorporators.

H. D. Crowder, representing the British-American Agencies, Ltd., Mexico City, was in Cincinnati last week conferring with different machine tool manufacturers. It is understood that this company is also desirous of securing the agency for other lines of machinery and kindred supplies.

John H. Gibson has been appointed receiver for the I. & E. Greenwald Company, Cincinnati. It is announced that the company's plant on Pearl street will continue to be operated on full time.

The John B. Fey Company, maker of physicians' and hospital apparatus, is moving its plant from Akron, Ohio, to Cincinnati. Quarters have been leased from the Steubing Automatic Machine Company, 308-310 Walnut street.

The municipality of Navarre, Ohio, has had plans prepared for a water works system. Bids will be received for the necessary equipment at an early date.

Considerable heating and ventilating equipment will be required for a building to be erected for the University of Cincinnati at 646 to 650 Main street, Cincinnati. Rapp, Zettell & Rapp, Johnston Building, have the plans in charge.

It is reported that the Knabe Brothers Company, piano manufacturer, will rebuild its plant at Norwood, a Cincinnati suburb. Its factory was recently destroyed by fire, but temporary manufacturing quarters were secured in a downtown building.

The Borchers Carriage & Automobile Company, Dayton, Ohio, has acquired an additional floor in the Armory Building, which will be used for an automobile repair shop. The company will be in the market for some small machine tools within the next 60 days.

The Conover-Overhamp Machine & Tool Company, Dayton, Ohio, has been incorporated to take over the plant and business of the Miami Valley Machine Tool Company, and is planning some improvements to its plant which include new machine tools. The company will continue the manufacture of the Miami line of lathes, high-speed drilling machines and tool-grinding machines, and is planning to put upon the market an 18 to 20-in. lathe with or without quick-change gear box and a line of gap lathes. P. P. H. Conover, who has been connected with the Miami Valley Machine Tool Company since its organization, will continue to look after the sales end of the business. C. H. Overkamp, the new member of the company, has been identified with the machine tool business in Cincinnati for a number of years.

Detroit

DETROIT, MICH., March 5, 1912.

No marked improvement is noticeable in the local machinery market. The week's transactions have been confined almost wholly to small sales, and buying is lethargic, not only in Detroit, but throughout the State, dealers reporting that the State market is exceptionally quiet. Electrical equipment is in fair demand and inquiries for a considerable number of fair-sized installations are pending. Contractors' supplies and equipment are also more active. Michigan is slowly recovering from the effects of the protracted cold spell which has hindered manufacturers generally by causing both coal and car shortages, which has resulted in marked curtailment of production in many plants. Foundry operations are being conducted on a more satisfactory basis, due largely to activity in the automobile trade, and this is true also of the forge industry.

The Warren Motor Car Company has increased its capital stock from $300,000 to $600,000, this step having been made necessary because of rapidly increasing business and the consequent need for greater manufacturing facilities. The company is not yet ready to make known its plans for new buildings or equipment.

The Snell Creamery Company will erect a branch factory at John R. and High streets, in which will be installed refrigerating equipment and an icecream manufacturing plant.

The A. C. Knapp Company has been incorporated, with $20,000 capital stock, to manufacture automobile parts and accessories. The incorporators are A. C. Knapp, L. A. Droelle and W. S. Harrison.

The Wilkinson Motor Starter Company has been organized with $50,000 capital stock by B. E., R. S. and F. J. Brown, and will engage in the manufacture of an automobile engine starter of new design.

The R-C-H Corporation, automobile manufacturer, has leased the buildings on Monroe avenue, formerly occupied by the Herbert Mfg. Company, and will utilize them for the manufacture of electric automobiles. This move will enable the company to devote its entire present plant to the manufacture of gasoline cars.

Young Bros., makers of sheet metal specialties, have begun the erection of a one-story addition to their plant on Franklin street.

The Briggs Mfg. Company, manufacturer of automobile bodies, contemplates the erection of a five-story addition to its present factory.

The business of the Weir-Horton Mfg. Company, maker of motor cycles, will be moved from this city to Grass Lake, Mich., where a stock company has been organized to take over the business.

The Alpena Woolen Mill Company, Alpena, Mich., will remodel its mill and equip it throughout with new machinery. D. D. Hanover is manager.

The Schmid Chemical Company, Jackson, Mich., is having plans prepared for an addition to its plant, three stories and basement, and has increased its capital stock to $250,000, to provide for the enlargement.

The main building of the Wyandotte Foundry Company, Wyandotte, Mich., was destroyed by fire the past week, causing a loss of $15,000. The company has decided to rebuild at once, probably on a larger scale.

The Page Auto Hoist Company has been incorporated at Grand Rapids, Mich., with a capital stock of $10,000, to manufacture automobile hoists. W. L. Page is the principal stockholder.

The Criswell Furniture Company and Buytem & Dozema, both of Grand Rapids, Mich., will merge their interests under the name of the former company. The new company will remove to a larger plant and the manufacturing facilities will be increased.

The city of Ypsilanti is asking for bids on a 10-ton steam power traction roller and is also in the market for a new boiler for the waterworks plant. Frank Joslyn is city clerk.

The Grand Rapids Motor Truck Company, Grand Rapids, Mich., which is a reorganization of the Decatur Motor Truck Company has purchased the factory of the Harrison Wagon Works and an adjacent tract of five acres for its new plant.

The Water Commission of Saginaw, Mich., has rejected all bids for the two auxiliary pumps for the east side waterwork and will ask for new tenders. The former bids were made on duplex pumps only, but the next proposal will ask for all styles of pumps.

The authorities of the Michigan State Prison at Jackson, Mich., have secured a building 60 x 160 ft., three stories, adjacent to the prison and will remodel it for use as a canning plant.

The plant of the Grand Rapids Cigar Box Company, Grand Rapids, Mich., was destroyed by fire February 28, entailing a loss of $40,000. The company will rebuild, it is stated.

The city of Benton Harbor, Mich., has plans prepared for the building of a 5,000,000-gal. pumping station and waterworks plant.

Indianapolis

INDIANAPOLIS, IND., March 5, 1912.

The National Specialty Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock, to manufacture household articles. The directors are Louis B. Maas, E. E. Maas and C. G. Brooks.

The Empire Automobile Company, Indianapolis, has been incorporated with $100,000 capital stock, to manufacture automobiles. The directors are C. E. Gibson, C. B. Sommers, Aaron Waldheim, David Sommers and David May.

The Woodside Machine Shop, Indianapolis, has been incorporated to manufacture and repair all kinds of machinery. The directors are A. C. Schoen, A. J. Schoen, C. S. Pollard, Harvey Wilhite and George Richart.

The Engman-Matthews Range Company, South Bend, Ind., has been incorporated with $200,000 capital stock, to manufacture stoves, ranges, etc. The directors are H. A. Engman, Jr., L. C. Matthews and M. B. Engman.

The Warren Engineering Company, Terre Haute, Ind., has been incorporated with $25,000 capital stock, to do a general construction business. The directors are W. P. Ijams, J. W. Ijams and G. E. Bowman.

The Given Moore Company, Columbus, Ind., has been incorporated with $25,000 capital stock, to manufacture a new power washing machine and farm implements. The directors are Given Moore, A. C. Moore and A. Moore. Mr. Given Moore is general manager of the Caldwell Mfg. Company, and sales manager of the gasoline engine department of the Reeves Pulley Company.

Plans for the rebuilding of the waterworks at South Bend, Ind., have been accepted. The cost will be approximately $400,000. Burns & McDonnell, Kansas City, Mo., are engineers for the first part of the work, to cost $200,000. A power house will be erected, a reservoir built and pumps installed with 10,000,000 gal. capacity.

A campaign to induce factories to locate at Greensburg, Ind., is to be made by the Greensburg Commercial Club. The president is L. D. Braden; secretary, John W. Craig.

Herbert C. Jones has been appointed receiver of the Clark Motor Car Company, of Shelbyville, Ind. The indebtedness is given at $25,000.

The Indiana Gas Transportation Company, Lafayette, Ind., has been incorporated with $150,000 capital stock, to suply light, heat and power. The directors are A. E. Scheibe, B. P. Shearon and L. E. Watson.

The Grace Construction & Supply Company, Ft. Wayne, Ind., has been incorporated with $50,000 capital stock, to do a general contracting and construction business. The directors are M. J. Grace, C. M. Dumpper and J. C. Depue.

The city of Mishawaka, Ind., has authorized the issuance of bonds to the amount of $70,000, to provide for waterworks improvements.

The Fry Bros. Mfg. Company, Richmond, Ind., has been incorporated with $30,000 capital stock, to manufacture furniture. The directors are J. E. Fry, F. Fry and C. A. Fry.

The City Council of Tipton, Ind., has granted a franchise for an artificial gas plant to A. G. Ogburn and associates for 25 years. A plant will be built.

L. A. Boli, general manager of the American Automobile Mfg. Company, New Albany, Ind., which recently went into the hands of a receiver, has been appointed chairman of a reorganization committee of the stockholders. It is planned to terminate the receivership as speedily as possible and to reorganize with $250,000 capital stock as the American Automobile Corporation. Old stockholders will be given 40 per cent. of their holdings in stock in the new company, and the plant will be kept in operation.

The South

LOUISVILLE, KY., March 5, 1912.

Weather conditions in the Central South have improved rapidly of late, and those selling in that territory report a much better feeling. States in the Southwest, beyond the Mississippi River, however, are doing comparatively little, bad crops and poor cotton prices affecting them adversely. Kentucky continues in good shape on account of the unexpectedly high prices at which tobacco is being marketed, and if the severe weather which has marked 1912 thus far is broken, as it should be, by normal spring conditions, business will be greatly stimulated. Public service improvements are continuing to take a large amount of equipment, and sales are reported by manufacturers and dealers to have been good. Some factories plan to work night shifts during the remainder of this month.

The Mengel Box Company, Louisville, which recently announced plans for the equipment of a corrugated paper box department, has let a contract for the special machinery needed to Knowlton & Co., of Rochester. The department will have a capacity of 20,000 boxes a day.

The O. K. Stove & Range Company, Louisville, which is substituting electricity for steam in the operation of its foundry, has let a contract for the motor installation to the General Electric Company.

The Henry Vogt Machine Company, Louisville, has sold two 105 hp. water-tube boilers to the Hopkinsville Water Company, Hopkinsville, Ky. The details of the Louisville City Hospital award include three 270 hp. water-tube boilers and a 20-ton refrigerating plant.

E. D. Morton & Co., Louisville dealers, have been appointed representatives of the Grip Coupling Company, Ware, Mass. They have sold A. J. Anderson & Co., contractors for the Lincoln Industrial Institute, Simpsonville, Ky., a Williams' regulator.

The Culley Cement Block Company, Louisville, has increased its capital stock from $15,000 to $50,000, and will install additional cement-working equipment.

The American Metallic Packing Company, Lexington, Ky., is in the market for a bolt-cutter or threading machine, as well as a handpower bolt-deader. Used machinery is desired.,

The Kentucky River Hardwood Company, Quicksand, Ky., which is developing an oak timber tract in Breathitt County, is in the market for some logging railroad equipment, including two used locomotives, 42-inch gauge.

It is reported that the Louisville & Nashville Railroad will construct three bridges across Red River and How's Creek in Clark County, near Winchester, Ky. The railroad is also reported to be planning the construction of division shops at Winchester.

The Knox Coal Mining Company, recently incorporated in Louisville with $1,000,000 capital stock, will develop coal lands in Knox and Clay Counties, Ky. Benjamin L. Bruner, president Commercial Bank & Trust Company, Louisville; F. D. Sampson, Barbourville, and Joseph F. Bosworth, Middlesboro, are among the incorporators.

The Southern Kentucky Machinery Company, Bowling Green, Ky., has been organized by J. W. Bearce. Several manufacturers will be represented, the Fairbanks-Morse line being among those which will be handled.

Coal washers are being installed by a number of large producers in the Southeastern Kentucky district. The Nicholson, Columbia and Edewood companies are among those which are making improvements in this direction.

W. A. Waller & Co., Henderson, Ky., will erect a large grain elevator at Sturgis, Ky. The conveying machinery to be installed will be motor driven. J. W. Quinn is manager of the company at Sturgis.

The Cumberland Light & Ice Company, Pineville, Ky., is installing additional machinery in its electric light plant. Power is to be supplied hereafter to manufacturing concerns.

Jesse Kirkland, Hardin, Ky., is aiding in the organ-

ization of a company for the establishment of an electric light plant.

Owensboro, Ky., is considering installing additional machinery in its water plant as the result of a fire underwriters' report indicating that facilities are inadequate.

A company is being organized at Barbourville, Ky., for the erection of an ice factory.

The Consolidated Coal Company, Baltimore, Md., which is building several industrial towns in eastern Kentucky for the development of its coal properties, has established a machine shop at Jenkins, Ky.

N. C. Ridgeway, mayor of Falmouth, Ky., will receive bids March 11 for an electric lighting equipment consisting of 25 to 50 kva engine and generator, switchboard, boiler, etc., according to plans and specifications on file with Anderson & Frankel, engineers, Lexington, Ky.

The Fulton Electric Light & Power Company, Fulton, Ky., has been incorporated with a capital stock of $10,000 by John Howell Hooks, E. B. Wade and M. E. Wade.

The Williams Coal & Coke Company, Paintsville, Ky., has been incorporated with $300,000 capital stock by John C. C. Mayo, John F. Hager, George F. Copeland and K. M. Fitzgerald.

Mowbray & Robinson, Cincinnati, O., are building an additional sawmill at Quicksand, Ky. The mill is to be completed by May 1, and will give the company four band and two circular sawmills, with a daily capacity of 125,000 ft.

J. V. Uppington, Lexington, Ky., who has sold the site of his carriage factory, has announced that a new factory will be erected in the near future.

Paris, Ky., has under consideration plans for the erection of a municipal electric light and power plant, to cost $50,000.

Job Inskeep, Russellville, O., is reported to be planning the erection of a canning plant at Dover, Ky.

The Imperial Realty Company, Knoxville, Tenn., has announced plans for the erection of an eight-story hotel to cost $500,000. The type of the structure has not been announced. The equipment will include an electric lighting plant, a refrigerating plant, heating and ventilating systems, high-speed elevators, etc. Richards, McCarty & Buford, Columbus, O., have drawn plans for the building.

D. R. Hulsart and J. E. Soaper, Sidney, O., will establish a plant at Morristown, Tenn., for the manufacture of wooden boxes and crates.

The Davis Automatic Filing Company, Bristol, Tenn., has been incorporated with $200,000 capital stock by E. S. Davis, George M. Turner and T. P. Godsey. The company will manufacture filing devices.

M. A. Green, Columbia, Tenn., plans to rebuild a grain elevator and flour mill which were recently burned.

The Diamond Block Machine Company, Bristol, Tenn., has been incorporated with $20,000 capital stock for the manufacture of concrete-block and brick machinery. Luke T. Low is president of the company, which will have the machines manufactured for the present by contract.

The Tennessee Jellico Coal Company, Block, Tenn., which was incorporated with $300,000 capital stock by Robert Wedekind, Louisville, Ky., and others, is to establish main offices at Knoxville, Tenn., taking over properties of the Block Coal & Coke Company and the Jellico Coal Company, Anthras, Tenn. The company will construct a washer and tipple at Block and will increase the output of the mines to 1000 tons a day.

A $50,000 company is being formed at Rogersville, Tenn., for the purpose of establishing a knitting mill.

Amended articles of incorporation have been filed by the Columbian Iron Works, Chattanooga, Tenn., increasing the capital stock of the company from $125,000 to $300,000. C. D. Richeson, J. W. Conway and others are among the stockholders.

Lynnville, Tenn., is preparing to secure bids on the installation of an electric light plant.

It is reported that the Mt. Pleasant Auto & Machine Company, Mt. Pleasant, Tenn., is to be taken over by a new company organized for the purpose of operating a foundry.

The Stone, Huling Company, Bristol, Tenn., is to erect a three-story 150 x 200-ft. woodworking plant in the immediate future.

John C. Dix, Son & Co., Memphis, Tenn., are erecting an addition to their wagon and carriage factory.

The Daisy Turpentine Cup Company, Chattanooga, Tenn., has established a plant at Daisy, a short distance from Chattanooga, for the manufacture of turpentine cups. The company is a clay-working concern.

The Indiana Lumber Company, Nashville, Tenn., will install a new boiler in its power plant. The city authorities have pronounced the present equipment unsafe.

The Caraway Mfg. Company, Nashville, Tenn., has been incorporated with $100,000 capital stock for the manufacture of spokes, handles, table rims and other wood specialties. R. F. Caraway, head of the concern, has been operating a number of small plants at Monterey and other Tennessee points.

The Corinth Machinery Company, Corinth, Miss., has been incorporated with $25,000 capital stock by H. E. Ray, L. F. Garrett and others.

The Carson-Hubbard Mill Company, Taylorsville, N. C., is preparing to erect a plant for the manufacture of a patented cornmeal mill, and will require lathes, press drills, woodworking machinery, etc. J. C. Conelly is manager of the company.

St. Louis

ST. LOUIS, MO., March 4, 1912.

The tendencies in the machine tool market have not developed changes of moment during the past week, though there is a better tone, chiefly due to the improved commercial feeling apparent in this section of the country. A casting up of totals for the first two months of the year is showing a better aggregate than was anticipated with the result that there is greater hope entertained for the actual opening of spring. In the meantime the activity, such as there is, continues to be confined to single tool demands and some second-hand inquiry.

The St. Louis Cereal Mills Company, St. Louis, has been incorporated with $45,000 capital stock by George C. and E. A. Hofferkamp, of St. Louis, and Charles D. Scott, of Topeka, Kan., and will equip a mill at once.

The Ozark Power & Water Company, whose plans were detailed last week, has formally increased its capital stock from $875,000 to $2,000,000. Bonds will also be issued.

The Tampico Farmers' Elevator Company, Tampico, Ill., with $100,000 capital stock, has been incorporated by J. S. Johnson, J. L. Wetzell and E. W. Meredith and will equip an elevator at once.

The Chaffee Ice & Cold Storage Company, Chaffee, Mo., has been incorporated with $20,000 capital stock by H. C. Schult, J. S. Wahl and L. J. Hazel and an ice making plant will be built and equipped at once.

The Farmers Elevator Company, Alexander, Ill., has been organized with $100,000 capital stock by B. D. Davenport, G. C. Cockin and O. E. Ryan to equip a grain elevator at once.

The City Council of Alton, Ill., has turned down a proposal for a municipally operated electric light plant and will advertise for bids for a franchise to equip a plant and serve the city and individual consumers.

Fire the past week destroyed a large portion of the plant of the Missouri Malleable Iron Company, East St. Louis. The net loss is about $50,000. Considerable new machinery and other equipment will be needed, it is stated.

The Excelsior Tool & Machine Company, East St. Louis, Ill., the past week shipped the last of twenty-two spillway gate seats for the Panama Canal. The total tonnage was 1,500,000 pounds and the work required five months.

The Acme Machine Works, St. Louis, with $60,000 capital stock, has been incorporated by J. W. Ellebrecht, Frederick and M. Boercher and will equip a machine shop to manufacture machine tools.

The Pehle Metal Products Company, Kansas City, Mo., with $25,000 capital stock, has been organized by F. W. McMillan, B. H. Smith and W. W. Pehle.

The Kansas City Metal Products Company, Kansas City, Mo., has been incorporated with $100,000 capital stock by A. F. Brocker, H. J. Olney and F. E. Loveland.

The Valier & Spiers Milling Company, St. Louis, has concluded the preparation of plans for the construction and equipment of a large mill, making the third under the control of that company, the others being in Illinois.

The Tebbetts Mill & Elevator Company, Tebbetts, Mo., has been incorporated with $12,000 capital stock by H. N. Roberts, S. C. Southern and W. R. Hord to equip a mill and elevator.

The Revenue Mining Company, Joplin, Mo., has been incorporated by Frank X. and E. A. Mattes and I. W. Frey to equip and operate mining property owned by the incorporators.

The Stag Mining Company, Neck City, Mo., has been incorporated with $48,000 capital stock by C. C. Yoder, Alex Larkin and Lafayette Rhodes to equip with machinery mining property owned by the incorporators.

The Chamber of Commerce of Little Rock, Ark., has closed a contract with Benj. Weil & Sons, of Evansville, Ind., under which the latter have agreed to establish a packing plant in Little Rock, equipped with modern machinery and to involve an investment of not less than $200,000.

The McEwen Bros. Mfg. Company, Tulsa, Okla., has arranged for a building site in that city upon which a factory building will be erected. It is estimated that the buildings and equipment to be purchased will represent an expenditure of $75,000.

The Tulsa Stove & Foundry Company, Tulsa, Okla., is being organized by A. C. Apitznagel, of Springfield, Mo., and others. The company is to have $50,000 capital stock.

The American Machinery & Supply Company, State National Bank Building, Oklahoma City, Okla., is being organized for the purpose of selling boilers, engines, pumps and other machinery.

Texas

AUSTIN, TEXAS, March 2, 1912.

An unusual amount of activity in the way of establishing manufacturing plants is noted in different parts of Texas. The demand for small machinery and tools is very good, according to reports of dealers. Industrial conditions in the state, as well as in Arizona and New Mexico, continue highly satisfactory. Business in Mexico is practically at a standstill on account of the continuation of the internal disturbances here.

C. U. Dahlgren, Gloucester, Miss., has been investigating the situation with a view of establishing a large cotton-seed oil mill at Brownsville, Texas. The plant will be ready for operation the coming season.

The Wisconsin Sugar Beet Company, Milwaukee, Wis., has taken preliminary steps to establish three beet sugar factories in Texas. One of these is to be located at Austin, another at Plainview and a third at Amarillo. It is stated by R. G. Wagner, president of the company, that each factory will cost from $1,000,000 to $1,500,000.

The Merchants' Irrigation Company has been formed at Markham, with a capital stock of $50,000. The incorporators are J. M. Moore, A. J. Harty, N. M. Gegelsand and David Rice.

The Gilmer Cottonseed Oil Company, Gilmer, has been formed with a capital stock of $25,000. The incorporators are M. E. Sullenberger, B. D. Futrell and H. P. McGaughey.

The Eagle Pass Ice Mfg. Company, Eagle Pass, has been formed with a capital stock of $25,000. The incorporators are E. H. Schmidt, R. C. Debena, L. C. Debena and others.

The Commissioners Court of Galveston County has under consideration the erection of a new jail. The present building which is used for that purpose will be torn down, it is stated.

The Merchants' Ice & Cold Storage Company will double the capacity of its ice factory and cold storage plant at San Antonio. When this is done more than $300,000 will have been invested in the industry. The company is composed of J. H. Kirkpatrick, George B. Marshall, C. W. Fichtner of San Antonio, W. S. Montz, S. Thurstensen, George C. Montz and Adam Vogt, all of Louisville, Ky.

The City Council of Victoria has granted a franchise to M. L. Potash and associates for a term of 50 years for the establishment of a gas plant and distributing system. The ordinance provides for the construction work to begin not later than August 1, 1913.

Hanstrom & Tinning will install a system of water works at Hutto.

The American Sugar Refining & Mfg. Company of Salt Lake City and Denver has been investigating the situation at Pecos, Texas, with a view of erecting a large beet sugar factory. L. B. Wilhelm of Boulder, Colo., sugar beet expert, has the preliminary arrangements in charge.

W. C. Shaw of New York, who recently purchased a plantation containing 823 acres near Brownsville, will construct a large system of irrigation to water the land. Embraced in the plans is the installation of a pumping plant. The water supply will be obtained from the Rio Grande.

The Kansas City, Mexico & Orient Railroad will move its shops from Sweetwater to San Angelo, the State Supreme Court having decided that the railroad has the right to effect this change.

The Price-Booker Mfg. Company, San Antonio, will move its large pickle and vinegar factory to Houston and will consolidate it with the plant of the Dew Bros. Syrup Company.

St. Louis capitalists have financed the past week an interurban line to run from Dallas to Waco, the amount involved being about $5,000,000. Power plants, equipment, etc., are involved in the deal and construction work will begin June 1. The Southern Traction Company, of which J. F. Strickland and Osce Goodwin of Dallas are the chief owners, is the company involved.

The City Council of Temple has contracted for the erection of a garbage crematory and incineration plant at a cost of $5,000.

The Dallas Marble & Granite Works, Inc., has been formed at Dallas with a capital stock of $20,000. The incorporators are George A. Tumlin, W. B. Harrison, Lee Sherill and John T. Burnham.

O. A. Zumwalt, E. A. Hutchins and C. E. Sour of Columbus are promoting the construction of a dam across the Colorado River at that place and the installation of a hydroelectric plant. Preliminary surveys show that by the constructing of a 22-ft. dam 2300 hp. can be developed. It is planned that this power shall be used for operating the proposed interurban electric railroad that is to run between Brenham and Columbus for operating irrigation pumps and various kinds of industries in that section.

The Consumers' Ice & Cold Storage Company is erecting a large ice plant at Brownsville.

The Texas Bag & Fibre Company will construct a factory in North Fort Worth at a cost of $500,000.

The Fort Worth Elevator Company, Fort Worth, has increased its capital stock from $150,000 to $250,000.

The City Commission of Austin has decided to submit to a vote of the taxpayers of Austin the proposition of issuing $750,000 bonds. Of this amount $250,000 are to be used for construction of sewer system.

The Mexican Land Company, of which John J. Conway of Mission, Texas, is the head, will construct a large system of irrigation and install a pumping plant for the purpose of reclaiming 50,000 acres of land situated in the lower valley of the Rio Grande, near Matamoros, Mexico.

The Compania Hidro-Electrica Mexicana, which was organized in Canada a short time ago with a capital stock of $15,000,000, has finished making the surveys for its three proposed hydroelectric plants that are to be installed in northeastern Mexico. One of the plants will be located on the Narangos River, near Micos, in the State of San Luis Potosi, and the other two on the Blanco River, one of them in the State of Nuevo Leon, and the other in Tamaulipas. The three plants will generate approximately 100,000 hp. Transmission lines will be constructed to Monterey, Saltillo, San Luis Potosi, Tampico, Victoria, Linares and other places.

The Pacific Coast

PORTLAND, ORE., February 27, 1912.

A few good-sized orders for machine tools have been placed this month and some additional inquiries are taking definite shape, though considerable business which was expected is very slow in coming out. The great bulk of the business is on single-tool orders, which keep up to about the former volume.

Operations in the general machinery market are broadening out to some extent. A noticeable feature is the large number of shipbuilding orders placed with many plants along the coast, mainly for wooden steamers for the coastwise lumber trade. Marine gas engines up to 150 hp. continue in strong demand, but many vessels recently ordered will require steam engines up to about 1,000 hp. Many new logging outfits are being placed and the demand for general woodworking machinery is well maintained. Sales of salmon cannery equipment are still a factor of some importance. Electrical machinery of all kinds is in strong demand and plans are being developed for several large hydroelectric projects. Extensive improvements are being made in many manufacturing plants of Oregon and Washington, including quarries and brick plants, paper mills, etc., and considerable contractors' equipment will be required for railroad and other construction projects to be carried out during the summer.

A revival of gold dredging operations in the Klondike region is predicted owing to recent extensive developments of hydroelectric power.

The Charles R. McCormick Company, operating a line of steamers and lumber mills at St. Helens, Ore., is adding a shipbuilding plant to its mill.

R. D. WOOD & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

The Boyce Machine Works, Seattle, Wash., has been incorporated with a capital stock of $15,000 by A. L. Boyce, M. E. McClellan and others.

Excavation contracts on the Lake Washington Ship Canal, Seattle, Wash., have been let to Stillwell Bros. and the Puget Sound Bridge & Dredging Company. Work is to start within 90 days.

The American Iron & Wire Works, Seattle, Wash., has been incorporated with a capital stock of $25,000 by C. W. Tuerke, F. D. Williamson and others.

The Pacific Coast Coal Company is preparing plans for a large briquette plant to be erected near Renton, Wash.

J. L. Kendall, Roseburg, Ore., is making arrangements for the installation of a sawmill at that place.

The Lewiston-Clarkston Improvement Company, Lewiston, Idaho, is working on a new hydroelectric power project to furnish current to the Grande Ronde country. The plant will be about 10,000 hp. capacity. Considerable tunnel work will be required.

The LaGrande Mfg. Company, recently organized for the manufacture of threshing machines, will put in a plant at Post Falls, Idaho.

The Dayton Mfg. Company, Dayton, Ore., has purchased a lot of machinery for the manufacture of tool handles, etc.

The Spokane Belting Company, Spokane, Wash., is installing a belting manufacturing plant and will open for business in March.

The Seattle Construction & Drydocks Company, Seattle, Wash., has started work on its new drydock, which is estimated to cost about $500,000, and will be of sufficient capacity to handle most of the vessels which now call at Pacific coast ports.

The Crown Columbia Paper Company is building a large addition to its plant at Camas, Wash. The boiler capacity will be increased by 1,000 hp.

The United Smelting & Refining Company plans to install a new stamp mill at the Rainbow Mine near Baker, Ore.

The Portland Lumber Company is preparing to put in a large logging plant near Riddle, Ore.

The C. H. Lilly Company is figuring on the installation of a large flour mill and grain elevator at Tacoma, Wash.

The Randolph Lumber Company, Coquille, Ore., is preparing to install a lot of new machinery in its sawmill and will also build a 7-mile logging railroad.

I. Kautz, this city, is preparing to install a complete woodworking plant at North Plains, Ore.

The contract for the equipment of municipal pumping station No. 2 of the San Francisco, Cal., fire protection system has been awarded to Chas. C. Moore & Co., that city, at $140,000.

The Acme Cement Plaster Company has about completed plans for a large plant at Gypsum, Wash.

Western Canada

WINNIPEG, MAN., February 29, 1912.

Announcements were made of several new apartments and office buildings to be erected this year in Winnipeg, and similar reports are coming to hand from the larger centres between Winnipeg and the Pacific coast. The outlook at Vancouver is particularly favorable from an industrial standpoint. The construction programs of the different railway companies throughout the country loom larger as the season advances.

The Great West Permanent Loan & Saving Company, Ltd., is considering plans for a seven-story office building on Main street, Winnipeg.

It is reported that the Lyall-Mitchell Company will erect a big business building on a prominent site on Main street, Winnipeg.

The Council of Wadena, Sask., will proceed at once to install a waterworks and electric light system, at a cost of $110,000.

For the first time since the Winnipeg power plant at Point DuBois was finished power is now available in the city for manufacturers.

The Canadian Talbot Boiler Company, New Westminster, B. C., is contemplating the erection of a new boiler plant.

The Winnipeg Ceiling & Roofing Company, Ltd., Winnipeg, is planning additions to the roofing factory. W. J. McMartin is manager.

A. H. Harman, 1207 Langley street, Victoria, has purchased a site in that city on which to erect an office building.

A by-law to expropriate five acres of land for the establishment of an incinerator plant will be submitted in Calgary, Alberta, shortly.

Government Purchases

WASHINGTON, D. C., March 4, 1912.

The Mississippi River Commission, Memphis, Tenn., will open bids March 26 for furnishing turbines, pumping sets, boilers and electric light plant. Information can be had of Charles S. Smith, Major Engineers.

The supervising architect, Treasury Department, Washington, will open bids April 5 for furnishing mechanical system of mail-handling apparatus for the United States Post Office, New York.

The supervising architect, Treasury Department, Washington, will open bids March 15 for furnishing and delivering two engines and generators for the United States Custom House, Cincinnati, Ohio.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids February 27 for material and supplies for the navy yards as follows:

Schedule 4267, class 22, ten pumps with spare parts, for Mare Island, Cal.—Bidder 21, Blake & Knowles Steam Pump Works, New York, $15,347.32; 40, W. T. Davidson, New York, $10,473.80, part: 144, Warren Steam Pump Company, New York, $16,244.05.

Schedule 4331, class 51, one vertical drilling machine for delivery to Charleston.—Bidder 94, Manning, Maxwell & Moore, New York, $748 and $1,037; 105, Niles-Bement-Pond Company, New York, $1,785.

Class 52, one hydrostatic wheel press for delivery to Charleston.—Bidder 12, Bethlehem Steel Company, South Bethlehem, Pa., $2,540; 33, Camden Iron Works, Camden, N. J., $2,650; 41, Drew Machinery Agency, Manchester, N. H., $2,825; 78, Kemp Machinery Company, Baltimore, Md., $2,510; 94, Manning, Maxwell & Moore, New York, $2,282; 105, Niles-Bement-Pond Company, New York, $2,680.

Class 53, one vertical milling machine for delivery to Charleston.—Bidder 14, Brown & Sharpe Mfg. Company, Providence, R. I., $2,208 and $2,220; 78, Kemp Machinery Company, Baltimore, Md., $2,057, $2,142, $2,394, $2,470 and $2,472; 94, Manning, Maxwell & Moore, New York, $1,475 and $1,945; 105, Niles-Bement-Pond Company, New York, $1,495; 120, Joseph T. Ryerson & Son, New York, $2,194.

Pressed Steel Forms for Concrete Sidewalks

The pressed steel forms for concrete sidewalks manufactured by the Berger Mfg. Company, Canton, O., are made on a principle which is new and extremely simple. They have maximum strength and are 20 per cent. lighter than any other metal form. They consist of rigid side rails, which are furnished regularly in lengths of 4, 6, 8 and 10 ft., but can be furnished up to 14 ft.; cross plates, which serve the dual purpose of holding the side rails in place and also dividing the walk into the required sized blocks; 6-in. radius curves, for connecting intersecting walks and for the inside of curves; and flexible side rails for the outside of curves of any radius. The cross plates are made in lengths of 2½, 3, 3½, 4, 4½ and 5 ft., so that a walk can be laid any of these widths. There are no projecting rivet heads to interfere with the finishing tools, a feature that is readily appreciated.

These steel forms save time in laying, setting up and truing to line, and they save time in removing the forms. All that is necessary to take them apart is to remove the spring wedge holding the cross plates and side rails together.

The concrete does not adhere to the smooth surface of the steel, and this leaves the concrete clean and smooth. The Berger company issues an interesting booklet on concrete sidewalk construction and these steel forms.

Transcontinental railroads have been ordered by the Interstate Commerce Commission to reduce their rates from St. Louis and other Mississippi River transfers to Denver on iron and steel bars from 63 cents to 52 cents per 100 lb., and on steel plates and sheets and structural steel (not fabricated) from 63 cents to 43 cents. The existing rates were attacked by the Vulcan Iron Works of Denver. Increases in freight rates on iron and steel articles proposed by many of the railroads operating east of the Mississippi River were suspended permanently, and the carriers were ordered to maintain their present rates.

The Blast Furnace Appliances Company, Cleveland, Ohio, recently incorporated, will take over the control of patents on blast furnace distributing devices that have been controlled by members of that company and will sell licenses for their construction. The company has elected the following officers: President, J. C. Cromwell; secretary and treasurer, Arthur G. McKee. The directors include Walter Kennedy, Pittsburgh; Frank K. Hoover, Chicago, and R. E. Baker and J. C. Cromwell, Cleveland.